Oracle Exadata Protection Made Easy:

Leverage Veeam to Simplify Your Database Backup and Recovery Strategy

Contents

Abstract

The backup and recovery demands of an Oracle Database Administrator's (DBA's) job used to be simple: Make sure that the handful of databases for which you're responsible never lose any data and ensure reasonably fast recovery whenever a critical datafile is lost or damaged.

But today's complex hybrid IT environments focus on speedy turnarounds for application development. That means the DBA must now be able to restore *any* of the hundred-or-so databases they're managing to just about *any* platform — whether in the cloud or on-premises — and to *any* available recovery point objective (RPO), even if it's in the distant past.

High-end workloads — whether purely transactional or focused on data-driven analytics — frequently demand the world-class performance that the Oracle Exadata Database Machine provides. However, Exadata often faces unique challenges and extra expenses for its backup and disaster recovery requirements.

In addition, database backups are a traditional point of friction between DBAs and broader IT infrastructure teams. Given the criticality of database systems, Oracle DBAs like to own the backup and recovery process, typically using its native

Recovery Manager (RMAN) toolset, while infrastructure teams prefer to use a common solution for all backups which can provide a single control plane for the backup.

These demands can overwhelm even an experienced Oracle DBA because they require instantaneous access to innumerable versions of required recovery files, which are often stored in external repositories. An inexperienced DBA might unwittingly choose the wrong recovery strategy and waste valuable application uptime for production applications and ongoing development efforts.

This paper explores several real-world and common database recovery and migration scenarios. Further, it explains how **Veeam® Plug-in *for Oracle RMAN*** simplifies backup file management, demystifies database restoration and recovery strategies across multiple platforms while enabling Oracle DBAs to control and monitor those strategies, regardless of their experience level. Veeam provides a single platform that meets the needs of both the infrastructure teams and the granular backup needs of the DBAs. We'll also discuss the recommended best practices for effectively implementing Veeam with Oracle and address how Veaam implements optimal security for offsite backup file storage.

Veeam Backup and Recovery (Veeam Backup & Replication) for Oracle Databases

Oracle Recovery Manager (RMAN) provides an elegant yet complex toolset that guarantees reliable Oracle database backup and recovery. As we explain in detail later in this white paper, however, if you don't know what you are doing during a recovery situation, you can do more damage than good by possibly transitioning from a complete recovery situation to an incomplete recovery situation. That's why Veeam Backup & Replication™, together with the Veeam Plug-in *for Oracle RMAN*, is your best option when deploying within Oracle database environments.

Key Features

Veeam aims to provide administrators with a single platform to perform backup and recovery tasks across their entire infrastructure. This allows DBAs, backup admins and other IT staff to have a single dashboard for backups across all their environments. Simplicity.

While incredibly powerful, both Oracle RDBMS and RMAN backup utilities are complex pieces of software, typically requiring trained professionals with a series of scripts and hands-on experience to maintain. The act of restoring and recovering a database within a production or development environment can require time from an already-busy DBA. Speed.

The performance of traditional disk-based backups is based on two main factors: First, the amount of bandwidth between the database server (be it physical or virtual) and the storage array to which you are backing up data; second, the performance of the database source storage array. Backups produce almost exclusively sequential I/O patterns and can have good performance on traditional hard disks. However, modern flash storage offers incredible performance for backup workloads.

Expandability

Veeam provides the ability to horizontally scale your backup storage via a scale-out design, which stores data in multiple tiers and utilizes the scale-out backup repository (SOBR) feature. The basic concepts of this infrastructure come in two tiers: a **performance tier** and a **capacity tier.** The performance tier is used for fast backup to restore — you might keep a week's or month's worth of backups in this performance tier. This tier is characterized by low latency, likely on the same network, with some or all the capacity being made up of SSDs. The capacity tier is designed for long-term storage. This can be either *object storage* or *managed storage* and will typically consist of high-density HDDs.

The benefit of this solution is that you have nearly unlimited capacity from using a cloud-based object store, allowing you to granularly manage your backup storage.

Differentiation from Other Strategies/Tools

Veeam augments standard Oracle backup strategies by providing a single platform that allows a DBA to have the full capacity of RMAN commands to perform database restores. DBAs can still perform their custom backups and restores using RMAN.

Advantages of Veeam Backup & Replication: Feedback from the Field

IT organizations with an Oracle database presence typically use customized RMAN scripts tailored to each set of database applications' availability requirements, which are combined with tools like Oracle Enterprise Manager (OEM) for management of their backup and recovery needs. While this provides robust management and oversight of specific *Oracle* database recoverability, it overlooks the need for management of other database and application environments. Veeam Backup & Replication offers the ability to comprehensively manage all environments with simplicity and consistency.

Manageability vs. RMAN/Oracle Enterprise Manager

OEM provides a great deal of functionality around managing Oracle database, database performance and all the various aspects of database administration. However, OEM requires both infrastructure and active management — it is not a trivial software stack and will require at least some of a DBA's time dedicated only to managing OEM. Beyond the management and infrastructure overhead, there can be hidden licensing costs for optional features, which can accidentally be enabled by well-meaning administrators. This can lead to painful Oracle licensing audits. Finally, OEM can be overwhelming for non-DBAs who may simply be trying to verify backups of an Oracle database in their environment.

Centralization and Control for System Reliability Engineers

One of the major benefits of using Veeam for all backups across your infrastructure is having a consistent user experience for backup and restore across a disparate array of system types. Whether using database engines such as Microsoft SQL Server, full Linux or Windows VM backups, or even Exchange email servers, the Veeam experience is consistent. With many IT organizations replacing the traditional sysadmin role with a combination of DevOps teams and site reliability engineers, having a simple, consistent backup and recovery experience (see **Figure 1**) gives organizations higher confidence in their data-protection strategy and allows for less downtime, as each system's subject matter expert does not necessarily have to be located in order to execute a database or virtual machine (VM) restore.
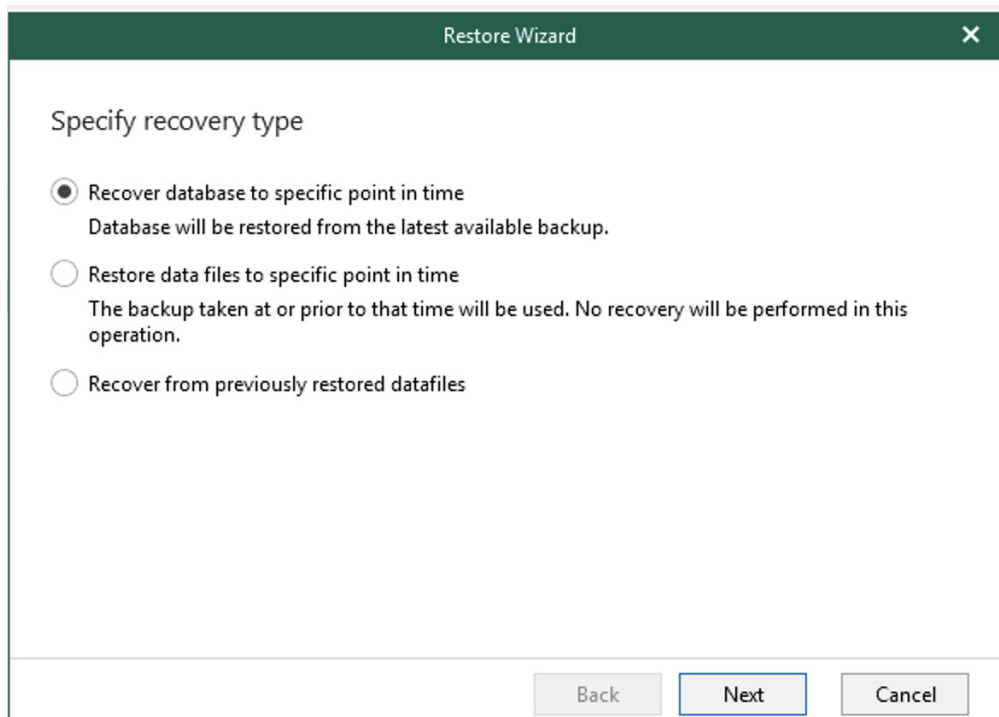
Figure 1. Point-in-time Recovery Wizard in Veeam Oracle Explorer

Oracle Database Backup and Recovery: The Basics

Because modern Oracle database architecture is extremely robust, database recovery situations have become rarer for DBAs. However, this also means that when a potential recovery scenario does occur, even an experienced DBA may not know exactly where to start. Between anguished cries from end users that "something's wrong with the database!" and management's demands to return applications to working status right now, you've got the perfect pressure-cooker situation in which mistakes happen and a perfectly recoverable database is no longer recoverable at all.

For those of you who are experienced Oracle DBAs, feel free to skip the following section. Keep reading, however, if you want to refresh your knowledge of the fundamentals of database backup strategies and common recovery situations that may occur.

Backup and Recovery Fundamentals

As the old saying goes, restore is more important than backup. This is especially true of active datasets, including datafiles and metadata used by relational database systems like Oracle. Thus, it is critical to have a backup environment that is integrated with the higher-level data management system, rather than simply copying files. The popularity of plug-ins like the Veeam Plug-in *for Oracle RMAN* is due to this reason: It allows backup copy to include all the information needed to return to operation.

This section of the paper gives a primer of the various logical structures and corresponding physical components which typically need to be protected within an Oracle database. We will first discuss the physical files that need to be protected in an Oracle instance and the process used to restore operation. We will then consider the pros and cons of user-managed backups versus integrated RMAN backups, as well as the recommended strategy for data protection. We will also consider the various backup media options available today, including tape, disk and remote or cloud storage. Finally, we will discuss the various forms that data recovery can take.

Oracle Database: Physical Files
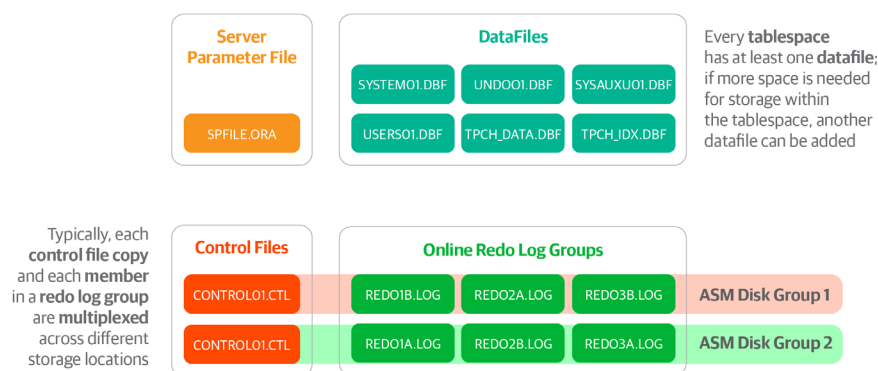
Figure 2. Oracle database: Key Components

Physical Files That Need Protection

Any backup solution needs to retain copies of certain physical files necessary to restart operation. When it comes to Oracle databases, the following physical files are crucial to be protected:

- The *server parameter file* (SPFILE) is a binary file that contains database- and instance-specific settings that determine a plethora of database features, including memory allocations, physical file locations, backup locations, query optimizer features and other crucial performance-related settings. The SPFILE must be present during instance startup to locate the database's control files so that they can be opened.

- *Control files* contain crucial information about the underlying physical components of the database, including the online state, location and recoverability of datafiles and transaction logs. When Oracle Recovery Manager (RMAN) is used to back up critical database physical components, the names, current location and status of those backup files are also retained within the control file. There are usually at least two control files which should be multiplexed across different physical storage to guarantee survivability.

- *Datafiles* are the physical manifestations of the database's tablespaces. They contain database blocks which in turn contain rows of data for tables and indexes. A key tablespace, the UNDO tablespace, also contains information about uncommitted transactions so that they can be quickly rolled back during transaction processing.

- *Online redo log members* contain the transaction log of the database. They contain both the undo and redo entries necessary to bring a database's datafiles to consistent state once transactions are committed. There are usually at least three online redo log member groups, each composed of at least two online redo log members, which are typically multiplexed across different physical storage devices to guarantee survivability of transaction logs. As each online redo log (ORL) is filled with transactions, it is automatically switched to the next ORL group so that transaction processing is not impeded. If the database is in ARCHIVELOG mode — which is highly recommended for complete recoverability — the ORL is immediately written to a secondary location as an archived redo log (ARL).

Physical Files Needed for Database Restoration and Recovery

Recovering an Oracle database is at least a two-step process: First, an appropriate version of the damaged component must be *restored* from a backup repository; then, the component must be *recovered* to the appropriate or desired point in time.
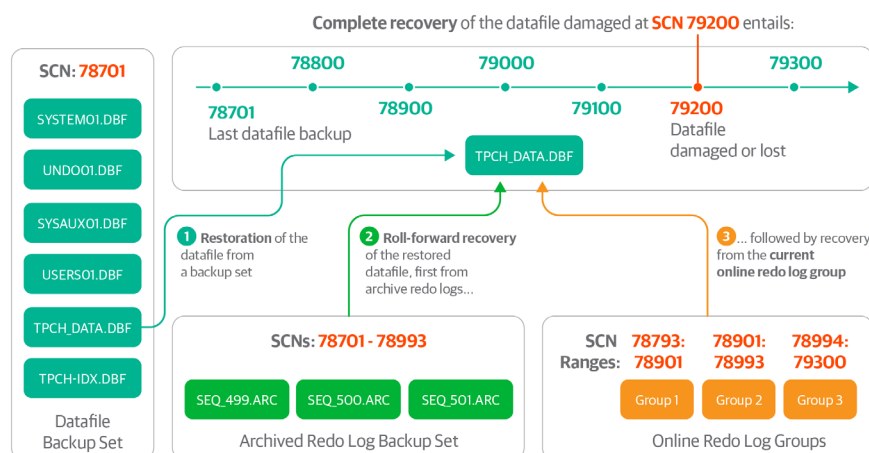
Oracle Database Restoration and Recovery

Figure 3. Oracle database recovery: Key concepts

Thus, it's crucial that a sufficient backup of the aforementioned physical files **must** be available:

- *Control file backups* contain a physical copy of the database's control file as well as a copy of the SPFILE. Note that while the SPFILE can be easily recreated from a non-binary source, it must be present to allow a database instance to be started.

- *Datafile backups* are physical copies of a datafile. Depending on how the backup is obtained, the datafile is not necessarily consistent with current transaction state. After the datafile is restored, it's necessary to apply redo and undo transactions from archived redo logs and current online redo logs to bring the datafile to its desired state.

- As its name suggests, an *archived redo log* is a physical copy of an online redo log. Once a redo log is switched, it is immediately copied to an alternate physical location, thus becoming an archived redo log and is retained for datafile recovery after datafiles are restored from backup.

Backup Strategies

User-Managed Backups vs. RMAN Backups

It is indeed possible to take backups of an Oracle database without using RMAN. This user-managed backup strategy — sometimes called a *hot backup* — requires the DBA to place the database's tablespaces into `BACKUP` mode via the `ALTER DATABASE BEGIN BACKUP;` command and then take a physical copy of all the tablespace's datafiles. While the datafiles are being backed up, any datafiles' changed blocks are written to the online redo log, which increases log-writing activity. Finally, the DBA must remember to place the database's tablespaces back online by issuing the `ALTER DATABASE END BACKUP;` command to complete the backup process.

While this strategy may appear simple to implement, it has numerous disadvantages. The DBA is completely responsible for keeping track of which backup files — including separate backup copies of the database's archived redo logs, control files and SPFILE — are still needed

to maintain the appropriate recovery point objective (RPO). The DBA is also responsible for deciding when it's acceptable to delete backup files that are no longer required to meet that RPO.

Note: Veeam's agent- and VM-based image backup leverages this approach with full automation for retention handling and restoration through Veeam Explorer™ *for Oracle*.

Conversely, RMAN provides excellent command-and-control capabilities versus user-managed backups. Within the database's control file, RMAN retains the settings that define the database's RPO as well as the exact backup files required to meet that designated RPO.

Image Copy vs. Backup Sets

When backing up a database's tablespace, you're really backing up its datafiles — more specifically, you're backing up the set of database blocks that comprises the datafile. You can back them up as either a *backup set* or as an *image copy*.

A *backup set* is a copy of all blocks in use that are below the current high-water mark (HWM) of the datafile. Thus, a backup set is usually smaller than an image copy backup, because it's very likely that some database blocks are not yet in use by the database.

Conversely, an *image copy* backs up the *entire* datafile, regardless of whether they're below or above the HWM or yet in use. While this takes up more storage space for the backup, it does offer some distinct advantages over a backup set. We'll discuss this in more detail below.

Multi-Piece Backups

RMAN also offers the ability to create multi-piece backup sets for an extremely large datafile. It essentially splits up what would be a huge backup set or image copy of a datafile into multiple sections, retaining the metadata about which subsections pertain to which datafile backup. This is especially advantageous when the underlying database hardware offers multiple CPUs and sufficient network bandwidth to create multiple RMAN channels while backing up or restoring a multi-piece backup: Backup or restoration workloads can run in parallel, thus reducing execution times significantly.

Merged Incremental Backups

Oracle has a strategy known as *merged incremental backups* while backing up a database via RMAN. This strategy insures flexible restore and recovery operations. Assuming an RPO of two days (48 hours) and a nightly backup cycle, here is a brief explanation of how that strategy works:

- During the *first* nightly backup cycle, RMAN backs up all archived redo logs, the current control file and the current SPFILE. It also creates an image copy backup of all current datafiles. This is the *last image copy backup* ever needed to be taken for these datafiles.

- During the *second* nightly backup cycle, RMAN creates backups of any new archived redo logs, any older archived redo logs that require additional copies for the specified retention period, the current control file and the current SPFILE. Also, if there are any new datafiles, it creates an image copy backup of them as well. However, for the datafiles that are *already* backed up as image copies during the *first* cycle, it only creates a backup set. These backup sets will only contain any changed blocks below the datafile's HWM and any new blocks above the HWM if the datafile has automatically extended due to internal space pressure.

- Finally, during the *third* (and all subsequent) nightly backup cycles, RMAN again creates backups of any new archived redo logs, any older archived redo logs that require additional copies for the specified retention

period, the current control file and the current SPFILE. Again, it creates an image copy backup for any new datafiles, as well as backup sets containing only changed and new blocks for datafiles that already have an image copy created in prior cycles. However, since the database's RPO has been defined as two days, any datafiles backed up as image copies during the *first* nightly cycle are *recovered forward by one day* using the backup sets from the *second* nightly cycle.

The key advantage of this merged incremental backup strategy is that since each datafile's image copy has already been recovered forward periodically, fewer backup pieces will need to be applied during restoration and recovery — thus potentially saving significant time during recovery of a crucial datafile. But there is one major disadvantage to this strategy: Datafile image copies must be written directly to disk to enable their roll-forward recovery, which essentially requires double the amount of disk space for these backups. Customers might leverage additional space of the backup target storage systems for this approach. In fact, no Oracle Media Management Layer (MML) — not even Oracle's own Cloud Secure Backup product — allows RMAN to write a datafile image copy directly to an alternate non-disk media.

We will therefore focus on the more traditional backup strategy that most Oracle shops employ when leveraging a robust MML — that is, using backup pieces to create an INCREMENTAL LEVEL 0 of each datafile once or twice per week, then creating INCREMENTAL LEVEL 1 backups on the intervening days of the week.

Oracle Merged Incremental Backup Strategy

Day 0

A full **image copy backup** is the basis for this strategy

Image Copy Backup

HWM →

Day +1

Only **changed** blocks and any **new extents** are captured via **incremental level 1** backup

Incremental Level 1 Backup

HWM →

Day +2

Changed blocks and **new extents** are captured via **level 1** backup

The previous day's **level 1** backup is applied to **recover** the oroginal **image copy** forward by 1 day
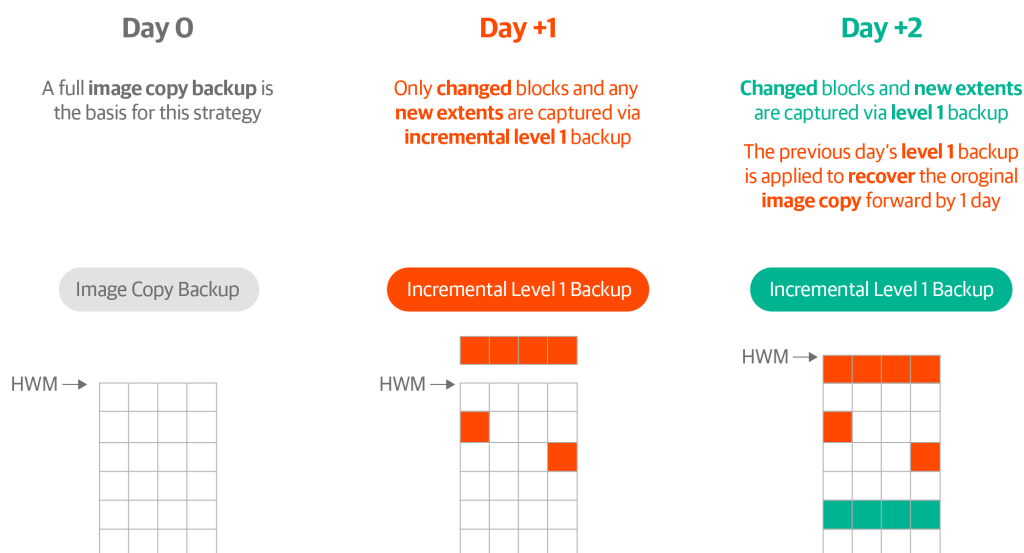
Incremental Level 1 Backup

HWM →

Figure 4. Merged incremental backup strategy

Storage Replication/Storage Snapshot Replication

There are some key differences between how RMAN takes backups as compared to other storage solutions that rely upon "snapshotting" the contents of the underlying physical media and then keeping track of any changed physical extents over time:

- Media-based backups bear no direct correlation to the primary method that an Oracle database uses to determine the breadth of the necessary recoverability — the *system change number* (SCN). The SCN of the current database incarnation constantly increases as time progresses. However, there is no guarantee that an SCN will correspond *precisely* to a particular moment in time.

- Since the SCN essentially records the exact relative point in time from the database's perspective, it drives all transaction processing and is used to determine when a transaction was committed. However, due to Oracle's internal COMMIT mechanisms, it's possible that the SCN could vary by *as much as three seconds* from the actual external "real-world" time.

- This means that a purely storage-based snapshot mechanism may be unable to accurately capture the precise state of the database at any point in time. The only truly reliable indicator of a complete recovery is whether the SCN of the final committed transaction has been traversed. This is also important because a transaction could be rolled back at a particular SCN and the storage-based snapshot would not know of this change in state.

As a result, it is impossible to reliably convert any backups of a database's data files taken using a storage snapshot method and then register those backup files as reliable RMAN backup files.

Backup Storage Media Options

Modern backup strategies have evolved over time — traditionally, nearly all backups were taken to tape, as the cost and lower density of hard disk drives (HDDs) made them a less attractive storage target. Over time, hard drive densities have grown — HDDs larger than 20TB have become commonly available. As well, archive storage appliances are available with configurations and features optimized for long-term storage, such as deduplication and compression, but most backups today are still taken to hard disk media. In the public cloud world, this has evolved to having the ability to backup to object-based storage of various tiers and costs. Finally, in some cases, databases are backed up to high throughput solid-state storage. In a typical use case, a business will demand extremely fast restores, whether for business continuity purposes or to clone databases to lower environments.

HDD/SSD Local Storage

While large, automated tape libraries were available at a large cost, the complexity of tape backup led many organizations to move to using disk-based storage for backup. Beyond the simplicity of disk, disk-based backup allows for software optimization — a good example of that is deduplication. Deduplication allows for multiple copies of data in more efficient fashion by only storing the changed data blocks from the original copy, trading this advantage for a decrease in restore performance.

Solid-state based backups are usually reserved for workloads that demand extremely low recovery time objective (RTO), which allow for the rapid restore and recovery of even some of the largest databases. Some flash storage appliances can restore at exceptional throughput rates.

Saving Backup Copies on Remote Storage

One of the biggest paradigm changes in backups has been the advent of using public cloud storage as a backup mechanism. Each of the public clouds (and even RDBMSs) have different mechanisms for how they are written to. The commonality is that they are object-based storage and typically require communication over an API for interaction, rather than direct file system calls.

Beyond public clouds, the popularity of the Amazon Web Services (AWS) S3 storage platform has led a number of vendors to adopt that protocol for other on-premises and cloud storage offerings. This means that any software package that supports S3, like Veeam, can support a wide variety of object storage platforms.

Recovery Options

An Oracle database can be recovered to either the current point in time or to an earlier point in time, should the DBA decide that approach to be pertinent. We briefly summarize the difference below.

Complete Recovery

Complete recovery means all data has been restored and recovered to the current point in time. To illustrate, let's assume that a tablespace's datafile has been damaged beyond repair, seriously corrupted due to media failure or simply deleted by accident.

In this situation, that tablespace's objects will be unavailable for access until the datafile has been restored and recovered:

- Once the defective datafile has been identified, a recent copy of the datafile must first be *restored* from a backup repository.

- Since the backup of the datafile is not synchronized with the state of the one that was missing or damaged, it must be *recovered forward to the current point in time* by applying redo entries from the transaction logs.

- In the likely event that the online redo log members do not contain all redo entries required for recovery, the appropriate archived redo logs must be located first and read to obtain the necessary redo entries to roll the datafile forward.

- Finally, redo entries retained within the most current online redo log are applied to complete the recovery.

The datafile is then brought back online and its tablespace is once again available for access.

Incomplete Recovery

Conversely, incomplete recovery means that a DBA makes a conscious decision to recover the entire database to a **prior** point in time, usually because of a specific user request.

Consider the example of a batch update procedure that has gone unexpectedly awry. As a result, a significant subset of data within several database objects has been corrupted beyond the ability to be reversed through emergency means — which, in itself, could miss some affected objects.

- The database must first be shut down and brought into MOUNT mode (i.e., with the database's control file opened).

- All datafiles must be restored from a backup prior to the point in time of the failed batch update.

- All datafiles must then be *recovered forward to the desired point in time* by applying redo entries from archived redo logs and online redo logs.

- Finally, the database must be opened in RESETLOGS mode.

Failed Complete Recovery Requires Incomplete Recovery

Finally, in rare cases, sometimes — usually due to not anticipating a single point of failure, unexpected media failure or an insufficiently robust backup strategy — a complete recovery situation unexpectedly becomes an incomplete recovery operation. This means that *data has been irretrievably lost*. In this situation, incomplete recovery procedures must be employed. The owners of the data must be informed of the extent of the lost data so it can be reapplied to the database using manual methods.

Recovery Levels

Depending on what needs recovery, RMAN offers several choices, ranging from the largest restore and recovery operation — an entire database — to the smallest, single database block.

Entire Database

Short of an unexpected site disaster, the need to restore and recover an existing production database running on extremely resilient hardware like Exadata is extremely unlikely. However, unexpected human error is still a possibility. For example, an entire Oracle database may be dropped by mistake or a huge number of database files have been deleted and it makes more sense to restore and recover the entire database, rather than take a piecemeal approach.

In these situations, the entire database can be restored from RMAN backups and then rolled forward to the most recently available archived redo log (and possibly the most current online redo log, should it still exist). As well, DBAs frequently leverage recent full-database backups as the starting point for cloning a production database for testing purposes or as the base from which the physical standby for a Data Guard disaster recovery configuration can be constructed.

Entire PDB

Oracle Database 19*c* (and newer) permits the restoration and recovery of a single PDB from backup files. This is an especially useful feature since it's entirely possible that a single CDB may contain multiple PDBs and that a DBA may clone a PDB from a prior state for application developers to begin a new coding effort. This gives a development team the option to reset a single PDB after a series of new development efforts, the execution of a standard set of unit tests to validate application performance or even the validation of database changes against a prior version of the application's schema(s).

Note: While Oracle multitenant architecture is not a new concept (it has existed since 2017, with the release of Oracle 12cR1), its capabilities vary significantly within each major and minor release of the database. Thus, it's important to review the pertinent [documentation](#) for your current database release to make sure the appropriate backup, restore and recovery commands are being used within your RMAN scripts.

Schema Within a Tablespace Set

Depending on the storage layout deployed for the database, it may be possible to restore and recover a single database schema if it spans one or more tablespaces. Experienced DBAs have often grouped a single set of tables, indexes and any related objects (e.g., external LOB segments) owned by the same user account — typically called a *schema* in Oracle database parlance — within a tablespace set, often provisioning tables into one tablespace, indexes into another tablespace and LOBs into yet another tablespace.

While not necessarily a requirement of good database management, this technique simplifies management of the self-contained and related database objects — both from a recovery perspective as well as to facilitate migration to a different database in the future. This strategy may also speed up restoration and recovery of tables and LOB segments first to make them immediately available for access afterwards; the DBA will typically then rebuild the indexes rather than restoring them from backup to potentially minimize recovery duration.

Another recovery technique — *Tablespace Point-in-Time Recovery* (TSPITR) — also leverages RMAN backups to build a copy of the tablespace set. TSPITR encompasses all related database objects by restoring them to an auxiliary database instance with sufficient storage, processing capacity and then recovering them to the desired point in time. The desired objects can then be recreated in the original source database, mostly using various manual methods. (See the discussion of the RMAN `FLASHBACK TABLE` option below for an example of leveraging this technique.)

Individual Tablespaces

A tablespace is a logical container for database objects — tables, indexes, LOB segments and (for the UNDO tablespace) UNDO segments. These objects are physically stored within the tablespace's underlying datafile(s). Depending on the maximum datafile size, it's not unlikely for a tablespace to be comprised of multiple datafiles.

Should one of the tablespace's datafiles become lost or damaged, the corresponding tablespace must first be taken offline, wherein its resident objects will be unavailable until datafile recovery is completed. Once the datafile is restored from the most current backup, it is recovered forward using all required archived and online redo logs until all transactions are applied. The datafile is then brought back online and the tablespace can be reactivated for access.

Note that the database's `SYSTEM` and `UNDO` tablespaces are special recovery situations. The database instance must be in `MOUNT` mode (i.e., with the database's control file opened, but no other tablespaces open yet) before recovery can proceed.

Individual Datafiles

This is probably the most common RMAN recovery situation in emergencies: A single datafile for a tablespace has been lost through corruption or damage of its underlying storage media, or it has been deleted accidentally. This is essentially the same recovery scenario explained previously for an individual tablespace, with special considerations for `SYSTEM` or `UNDO`.

Individual Indexes and Other Database Objects

Depending on what damage has been done, it may be simpler to recover a lost database object through several mechanisms:

- **Index dropped because table was dropped.** As noted above, if a table that was inadvertently dropped has been recovered using the `FLASHBACK TABLE TO BEFORE DROP` command, the table's indexes are also recoverable.

- **Index dropped independently of parent table.** A mistakenly dropped index may simply be faster to rebuild using the original `CREATE INDEX` statement. Naturally, however, index recreation time will vary based on size and complexity of the index.

- **Dropped/damaged LOB segments.** Recovery of large objects (LOBS) — including binary large objects (BLOBs), character large objects (CLOBs) and their variants — most likely will require recovery via manual means, including a combination of TSPITR or `RECOVER TABLE` techniques.

Sets of Transactions

As noted above, RMAN operations focus on restoration and recovery of database blocks. As a result, it does not provide any capabilities to restore and recover a single set of transactions. However, it may be possible to leverage the `FLASHBACK TABLE` command to rewind a table to a prior point in time, under the condition that certain prerequisites have been met. The `FLASHBACK TRANSACTION` command set may be employed to roll back and/or recover transactions at an atomic level.

Single Block Media

If only a small number of damaged or corrupted datafile blocks need to be recovered, the RMAN command `RECOVER DATAFILE {#} BLOCK {start#} TO {end#}` can be used to first restore recent copies of the damaged blocks from the last available RMAN backup, then use archived and online redo log entries to recover the block(s) forward to the current point in time. This process can be simplified by first issuing the `VALIDATE DATABASE` command to capture a list of all corrupted blocks and then issuing the `RECOVER CORRUPTION LIST` command.

Block media recovery does not require taking either the datafile or corresponding tablespace offline. Also note, if Data Guard has been employed to avert a disaster from loss of a complete datacenter site, it offers an option to enable *Automatic Block Media Recovery* from the corresponding physical standby database (and vice versa). Using this feature requires licensing the *Active Data Guard* option.

Control File

Losing all copies of the database's control file is an extremely unlikely situation while the database instance is operating normally. However, it is possible in the event of severe storage corruption or (more likely) human error, such as accidentally deleting the files manually.

In this situation, the database instance must first be shut down and restarted in `NOMOUNT` mode — with only the SPFILE opened — and then a control file copy must be restored from RMAN backups. Only then can the database be mounted to open the restored control file and eventually brought into `OPEN` mode.

Server Parameter File (SPFILE)

Losing the database's SPFILE is an equally unlikely scenario. Much like the loss of all control file copies, it is likely due to severe storage corruption or (more likely) human error, such as accidentally editing the binary SPFILE as if it were its predecessor parameter file (PFILE).

In this situation, the SPFILE can either be recovered from RMAN backups (note, it's sometimes faster to simply recreate the binary SPFILE from a PFILE using the `CREATE SPFILE FROM PFILE = {physical file}` command) or it *may* be necessary to shut down the database instance before completing the reconstruction or recovery of the SPFILE.

Special Considerations

Container and Pluggable Databases (CDBs and PDBs) vs. Non-Container Databases (NCDBs)

The advent of CDB and PDBs in Oracle Release 12*c*R1 introduced additional complexity for backing up databases versus a traditional NCDB database. Initial releases of CDBs didn't allow RMAN backups to be taken for each independent PDB within a CDB. However, as of Release 18*c*, it is now possible to back up and restore individual PDBs within a CDB without any additional downtime.

Note: As of Release 21c, Oracle will no longer support NCDB databases; database backup and recovery will thus be focused on individual PDBs within each CDB.

Real Application Clusters (RAC) Databases

Depending on the database release, RAC databases add some additional recoverability challenges:

- **Oracle Cluster Registry (OCR) file.** RAC records crucial information about the survivability of its clustered environment within the OCR file. There are special commands that can take a backup copy of the OCR; this physical file should be retained offsite for safekeeping in case of a storage failure or inadvertent removal of the OCR through human error.

- **Voting disks.** RAC clusterware uses voting disks to record the state of RAC nodes within the cluster itself. Upon the apparent loss of a cluster node, surviving RAC nodes use the voting disks to determine if the node has actually left the cluster for a sufficient length of time. It then must declare it as lost and begin remastery of database block images within the database buffer caches of database instances on the remaining cluster nodes. As of Release 12cR1, voting disks are automatically backed up on a regular basis and information for rebuilding them is retained within the OCR file. However, older clusterware releases may still use raw disk storage for voting disks. There are special clusterware commands for backing up those raw disks so they can be physically retained.

Exadata Database Machine

The Exadata Database Machine is Oracle's Engineered System optimized for running Oracle databases. First released in 2008, Exadata is an integrated solution combining compute, storage and networking for second-to-none database performance. With features like hybrid columnar compression and query offloading to storage cell, Exadata allows for unprecedented performance scaling.

In 2015, Oracle started offering Exadata machines in Oracle Cloud via the Exadata Cloud Service. Two years later, Oracle released Exadata Cloud@Customer. Both offerings provide the same Exadata hardware and performance as the on-premises version, but with Oracle managing the hardware, network, software and patching. The difference between Exadata Cloud Service and Exadata Cloud@Customer is simply that, with the Exadata Cloud Service, the actual physical hardware is located in a datacenter that is part of Oracle's nearly 40 public cloud regions. On the other hand, with Exadata Cloud@Customer, the hardware is located on-premises for customers while still leveraging Oracle's services.

Experimental Setup

Veeam Backup & Replication Environment

The Veeam Plug-in *for Oracle RMAN* allows DBAs or other backup/recovery administrators to use the Oracle Recovery Manager utility that is integrated directly with the Veeam Backup & Replication repositories. It does this by creating a link to the Veeam backup repositories as an Oracle RMAN System Backup to Tape (SBT) plug-in. The SBT plug-in approach allows vendors that are members of the Oracle Backup Solutions Program to develop this integration to forward RMAN backups to remote media — in this case, the Veeam Repository and Veeam Scale-out Backup Repository™.

On Exadata, there are two methods to install the plug-in: via RPM package or compressed TAR file. Both installation methods can be used with Exadata. RPM is usually used for manual installations, while the TAR file allows better integration into software distribution tools. Installation and configuration is very quick[1] [1]. **Figure 5** below shows the results of the basic setup procedure used for our Exadata environment. Note that we installed the Veeam Plug-in *for Oracle RMAN* on both database nodes of our Exadata cluster.

---

[1] Full documentation of install and configuration is available at https://helpcenter.veeam.com/docs/backup/plugins/install_plugin_linux.html

```
root$ rpm -i VeeamPlug-inforOracleRMAN-11.0.100.1261-1.x86_64.rpm


oracle$ cd /opt/veeam/VeeamPlug-inforOracleRMAN


oracle$ OracleRMANConfigTool --wizard


Enter backup server name or IP address: 172.24.114.101

Enter backup server port number: 10006

Enter username: administrator

Enter password for administrator:

Available repositories are:

1. ReFS Repository

Specify up to 4 Veeam repositories to use as target using whitespace as a separator: 1

Enter the number of data streams (From 1 to 254) to run in parallel for each reposi-
tory (RMAN DEVICE PARALLELISM value).

Channel count per device: 4

Do you want to use Veeam compression (Y/n):n

Save configuration?

1. Apply configuration to the Oracle environment

2. Export configuration into a file for manual setup

3. Cancel without saving

Enter:1


*** Database instance ORCL is configured ***
```

Figure 5. Installation of Veeam Plug-in on Exadata database node

Once the Veeam Plug-in has been deployed, the RMAN SHOW ALL; command displays the current backup and recovery configuration options that the deployment has been enabled, as shown in **Figure 6** below.

```
RMAN> show all;


using target database control file instead of recovery catalog


RMAN configuration parameters for database with db_unique_name DB01 are:

CONFIGURE RETENTION POLICY TO REDUNDANCY 1; # default

CONFIGURE BACKUP OPTIMIZATION OFF; # default

CONFIGURE DEFAULT DEVICE TYPE TO 'SBT_TAPE';
```

```
CONFIGURE CONTROLFILE AUTOBACKUP ON;

CONFIGURE CONTROLFILE AUTOBACKUP FORMAT FOR DEVICE TYPE 'SBT_TAPE' TO '%F_RMAN_AUTOBACKUP.vab';

CONFIGURE CONTROLFILE AUTOBACKUP FORMAT FOR DEVICE TYPE DISK TO '%F'; # default

CONFIGURE DEVICE TYPE 'SBT_TAPE' PARALLELISM 1 BACKUP TYPE TO BACKUPSET;

CONFIGURE DEVICE TYPE DISK PARALLELISM 1 BACKUP TYPE TO BACKUPSET; # default

CONFIGURE DATAFILE BACKUP COPIES FOR DEVICE TYPE 'SBT_TAPE' TO 1;

CONFIGURE DATAFILE BACKUP COPIES FOR DEVICE TYPE DISK TO 1; # default

CONFIGURE ARCHIVELOG BACKUP COPIES FOR DEVICE TYPE 'SBT_TAPE' TO 1;

CONFIGURE ARCHIVELOG BACKUP COPIES FOR DEVICE TYPE DISK TO 1; # default

CONFIGURE CHANNEL DEVICE TYPE 'SBT_TAPE'
  PARMS  'SBT_LIBRARY=/opt/veeam/VeeamPluginforOracleRMAN/libOracleRMANPlugin.so'

   FORMAT    '88788f9e-d8f5-4eb4-bc4f-9b3f5403bcec/RMAN_%I_%d_%T_%U.vab';

CONFIGURE MAXSETSIZE TO UNLIMITED; # default

CONFIGURE ENCRYPTION FOR DATABASE OFF; # default

CONFIGURE ENCRYPTION ALGORITHM 'AES128'; # default

CONFIGURE COMPRESSION ALGORITHM 'BASIC'
  AS OF RELEASE 'DEFAULT' OPTIMIZE FOR LOAD TRUE ; # default

CONFIGURE RMAN OUTPUT TO KEEP FOR 7 DAYS; # default

CONFIGURE ARCHIVELOG DELETION POLICY TO NONE; # default

CONFIGURE SNAPSHOT CONTROLFILE NAME TO '/u01/app/oracle/product/19.0.0/dbhome_1/dbs/snapcf_CDB19C.f'; #
default
```

Figure 6. Results of SHOW ALL; command invocation after installing plug-in

Exadata Environment

For our testing, an Exadata X5-2 quarter rack was set up in the Veeam lab environment. The Exadata X5-2 quarter rack comes with two database servers and three storage servers. In our configuration, the database servers each had two Intel Xeon E5-2699 v3 processors along with 256GB of memory. Each storage server has two 8-core processors for query processing along with flash drives and/or high-capacity drives for up to 109TB of usable capacity.

Database Schema Used

We chose the Transaction Performance Processing Council (TPC) TPC-H Standard 2.18.0 database schema for our testing purposes. We deployed two additional tablespaces — one for tables (TPCH _ DATA) and one for indexes (TPCH _ IDX) — and created a separate TPCH schema within a single PDB.

We then leveraged the well-known open source SwingBench toolset to populate the TPCH schema, sizing the database at approximately 1TB. Upon completion, the TPCH _ DATA and TPCH _ IDX tablespaces respectively consumed approximately 700GB and 308GB of disk space. No partitioning was employed for tables or indexes.

Database Workloads Executed

We also used SwingBench to generate a standard TPCH workload per the 2.18.0 standard during several of the identified backup and recovery scenarios. This standard workload consists of executing a simple batch processing DML operation through a singular database session while simultaneously executing a series of random parameterized queries from several other database sessions. This is intended to simulate more realistic recovery situations, during which separate database components — for example, the corresponding data file for the TPCH _ IDX tablespace — need immediate restoration and recovery due to physical loss or damage.

Backup Scenarios

One of the best things about the Veeam Plug-in *for Oracle RMAN* is that it seamlessly integrates the Veeam Backup & Replication platform with the Oracle RMAN utility. The Oracle RMAN utility has been around since Oracle 8, which was released back in 1997, over 25 years ago. This allows DBAs to control backup and recovery processes with a familiar and trustworthy tool.

Full Database Backup

Traditionally, Oracle DBAs have backed up a database instance with one simple command. **Figure 7** implements the BACKUP DATABASE RMAN command to back up the entire contents of the CDB database. This includes the CDB's separate SYSTEM and UNDO tablespaces, as well as of the ancillary tablespaces comprising the two PDBs, MINITPCH and MAXITPCH. Note that this command set also backs up all archived redo logs as well as the database's control file and SPFILE.

```
RMAN> backup database tag 'VLSS 5.1';
```

Figure 7. Backing up a complete CDB

A note on non-container databases vs. CDBs: Oracle databases that predate release 12cR1 do not have the ability to leverage the advantages of the multitenant infrastructure. As noted, starting with release 21c, Oracle database instances **must** adopt that architecture. However, many of Veeam's customers still employ the non-container (i.e., non-CDB) architecture because they have not yet fully tested their database applications within that multitenant architecture.

It's important to note that the **same** commands used to back up a complete CDB — which includes backing up the SYSTEM, SYSAUX and UNDO tablespaces shared across all PDBs within the CDB, as well as all the PDB-specific tablespaces — work *exactly the same* when backing up a non-CDB. There is no need to specify any additional parameters when backing up a non-CDB database. Likewise, the process to restore and recover a non-CDB is identical to the process to restore a complete CDB.

A detailed discussion of the myriad features of Oracle multitenant databases is well beyond the limited scope of this white paper. The Oracle 19c [Multitenant Administrator's Guide](#) provides a high-level summary of the key features and differentiators for CDBs and PDBs versus the more traditional non-CDB architecture.

Full PDB Backup

The ability to back up a single PDB from within a CDB is a crucial scenario, especially since most Oracle shops have been encouraged to upgrade their database environments to the Oracle 19*c* final release that will support both non-CDB and CDB database instances.

Figure 8 shows the invocation of an RMAN command script we issued to back up a single PDB — the smaller MINITPCH PDB — separately from its much-larger cousin, the MAXITPCH PDB, without disrupting any ongoing transactional activity in either PDB. Note that Oracle DBAs often prefer to leverage RMAN command scripts, such as the example shown here. Often delineated by a `RUN {…}` block, these scripts can be directly executed from a simple task scheduler like CRONTAB or even from a command shell prompt. It's important to note that since Veeam Plug-in *for Oracle RMAN* essentially issues native RMAN commands, *no changes are required for any existing RMAN command script.*

For example, consider this RMAN command file named `NightlyBackup.rcv`:

```
RUN {
show all;
backup pluggable database MINITPCH
    tag 'VLSS 5.2';
};
Issuing the following command would
connect to the database as SYS, invoke
the RMAN script (assuming it's present
in the same current directory) and exe-
cute its contents:
$> rman target / @NightlyBackup.rcv
```

Figure 8. Backing up a single PDB separately from its CDB

Tablespace Set Backup

Another common backup scenario is taking a snapshot of a tablespace set to enable a partial recovery of a self-contained, related set of data to a different database. **Figure 9** shows how we used RMAN to create a backup of the MINITPCH database's TPCH schema, including all tables and indexes needed for that recovery scenario.

```
RMAN> backup tablespace

        MINITPCH:TPCH_DATA,

        MINITPCH:TPCH_IDX
        tag ,VLSS 5.3';
```

Figure 9. Backing up all datafiles for an individual tablespace

Single Tablespace Backup

Another common yet simple backup task would be taking a "safety" backup of a single tablespace just in case we'd need to restore and recover it in the future. An example of this would be the event of a new application software release corrupting critical database objects. **Figure 10** shows how we backed up only the TPCH index tablespace in case we might need to restore and recover some indexes that are going to be removed as part of an upcoming major database object redeployment.

```
RMAN> backup tablespace MINITPCH:TPCH_
IDX tag 'VLSS 5.4';
```

Figure 10. Backing up a single database file for a tablespace

Multi-Piece Backup

As we discussed in Section 1.2.3, it's possible to leverage Exadata's robust storage network bandwidth, memory and CPU power to slice up a tablespace's datafiles into even smaller sections, thus enabling parallelization of backup I/O.

In **Figure 11**, we illustrate another example of using the RMAN RUN{}; block within a command file to back up only the TPCH index tablespace again, but this time creating smaller backup pieces sized no larger than 1GB.

Also note the example of the ALLOCATE CHANNEL [] command in this script. In this case, it sets two things: First, a specific transfer rate of 48MB per second during backup operations; second, the number of files allowed to be open for backup at any one time (to a maximum of four).

While the Veeam Backup & Recovery Plug-In for RMAN will certainly honor any valid ALLOCATE CHANNEL or CONFIGURE CHANNEL command, it's important to realize that Oracle databases running within an Exadata environment — especially if they are configured as RAC databases — are able to decide intelligently exactly how much I/O throughput and parallelism can be leveraged to back up and restore database files with utmost efficiency. For example, if one of the instances for a four-instance RAC database is unavailable for any reason, Oracle's robust clusterware will detect that and automatically exclude any attempts to allocate an I/O channel to that instance. Therefore, it's highly recommended to avoid specifying channels within RMAN command blocks and instead letting Exadata-based database instances make intelligent choices on exactly how much I/O bandwidth is allocated to RMAN operations.

```
RUN {

  ALLOCATE CHANNEL t48 DEVICE TYPE SBT
RATE 48M MAXOPENFILES 4;

  backup tablespace MINITPCH:TPCH_IDX

    SECTION SIZE 1G

    tag 'VLSS 5.5';

};
```

Figure 11. Backing up a tablespace with using a multi-piece backup strategy

Single Datafile Backup

A rarer scenario is to take a backup of a single tablespace. **Figure 12** shows how we backed up the SYSTEM tablespace for the CDB itself.

```
RMAN> backup datafile 1 tag 'VLSS 5.6';
```

Figure 12. Backing up a single database file for a tablespace

Archived Redo Logs Only Backup

As part of good housekeeping, Oracle DBAs regularly back up archived redo logs to alternate media. It is then (and only then!) that DBAs remove files crucial for a complete database recovery from the database's Fast Recovery Area (FRA). We show you how to tackle this critical task in **Figure 13.**

```
RMAN> backup archivelog all not backed
up delete all input tag 'VLSS 5.7';
```

Figure 13. Backing up selected ARLs, purging any of them once backup has been successfully taken

Control File Only Backup

Many database migration tasks regularly require a consistent, current image of the database's control file as a starting point. So, in **Figure 14**, we've taken a backup of our CDB's control file.

```
RMAN> backup current controlfile tag
'VLSS 5.8';
```

Figure 14. Backing up the CDB's control file

SPFILE/PFILE- Only Backup

One final backup scenario: **Figure 15** shows how to take a "safety copy" of the database's binary server parameter file (SPFILE).

```
RMAN> backup spfile tag 'VLSS 5.9';
```

Figure 15. Backing up the CDB's SPFILE

Recovery Scenarios

Complete Recovery to Current Point-in-Time

As we noted in **Section 1.5**, most database recovery operations are focused upon returning an Oracle database to the current point in time. We illustrate several of the most common scenarios in the following section.

Recovering an Entire Database

As shown in **Figure 16**, we recover the entire CDB and all related PDBs to the current point in time.

```
RMAN> startup mount;

restore database;

recover database;

alter database open resetlogs;
```

Figure 16. Recovering a complete CDB, including all PDBs, to the current point in time

Recovering a Single PDB

A more likely recovery scenario is the recovery of a single PDB while leaving the CDB itself and any other PDBs running. In **Figure 17** we demonstrate how to restore and recover only the **MINITPCH** PDB to the current point in time.

```
RMAN> run {

  RESTORE PLUGGABLE DATABASE MINITPCH;

  RECOVER PLUGGABLE DATABASE MINITPCH;

  ALTER PLUGGABLE DATABASE MINITPCH
OPEN;

}
```

Figure 17. Recovering an individual PDB to the current point in time

Recovering a Specific Tablespace Set

Another typical scenario Oracle DBAs encounter is the need to restore and recover just part of a database — perhaps a complete set of objects, including all tables and indexes, for a particular database schema. **Figure 18** shows how that could be accomplished for the tablespace set encompassing the **TPCH** schema.

```
RMAN> run {

  restore tablespace MINITPCH:TPCH_
DATA,MINITPCH:TPCH_IDX;

  recover tablespace MINITPCH:TPCH_
DATA,MINITPCH:TPCH_IDX;

  ALTER PLUGGABLE DATABASE MINITPCH
OPEN;

}
```

Figure 18. Recovering a single tablespace set to the current point in time

Recovering a Specific Tablespace

As previously noted in **Section 1.5.4**, it's not entirely unusual for an Oracle DBA to restore and recover a single tablespace. We show how to accomplish the restoration and recovery of the **TPCH_IDX** tablespace for the **MINITPCH** PDB to the current point in time in **Figure 19**.

```
run {

  restore tablespace MINITPCH:TPCH_IDX;

  recover tablespace MINITPCH:TPCH_IDX;

  ALTER PLUGGABLE DATABASE MINITPCH
OPEN;

}
```

Figure 19. Recovering a single tablespace to the current point in time

Recovering a Single Datafile

Even though Exadata storage infrastructure is extremely robust and unlikely to encounter the loss of or damage to a single datafile for a specific tablespace, it is possible that such a failure may occur in rare cases. **Figure 20** shows how to restore and recover a single datafile to the current point in time.

```
run {
   restore datafile 15;
   recover datafile 15;
   ALTER PLUGGABLE DATABASE MINITPCH
OPEN;
}
```

Figure 20. Recovering a single datafile to the current point in time

Incomplete Recovery to Previous Point-in-Time

While most recoveries are focused on returning the affected database component(s) to the most current point in time, we've noted in Section **1.4.2** instances of restoring components to a prior point in time. We review how that can be accomplished in the following subsections.

Entire Database

It's unlikely that a DBA would ever return a production database environment to a prior point in time unless there were compelling reasons to do so, as noted in Section **1.4.2**. However, it's not unheard of to roll back a testing environment to a point in time prior to the onset of an integrated testing exercise. In **Figure 21**, we show how to return a complete CDB to a prior point in time.

```
RMAN> run {
   SET UNTIL TIME "to_date('15-FEB-2022
00:00:00','DD-MON-YYYY HH24:MI:SS')";
   restore database;
   recover database;
   alter database open resetlogs;
}
```

Figure 21. Recovering a complete database to a prior point in time

Single Pluggable Database

As more IT shops adopt Oracle's multitenant architecture, they're able to leverage separate PDBs to build out separate evaluation environments for DevOps teams. **Figure 22** illustrates how to restore and recover a single PDB to a prior point in time, effectively resetting it after development or testing efforts.

```
RMAN> run {
   SET UNTIL TIME "to_date('15-FEB-2022
04:00:00','DD-MON-YYYY HH24:MI:SS')";
   RESTORE PLUGGABLE DATABASE MINITPCH;
   RECOVER PLUGGABLE DATABASE MINITPCH;
   ALTER PLUGGABLE DATABASE MINITPCH
OPEN;
}
```

Figure 22. Recovering a single PDB to a prior point in time

Single Tablespace

In concert with the prior scenario, a DBA may also opt to restore and recover a single tablespace to a prior point in time after development or testing efforts have concluded. We show in **Figure 23** how a DBA might restore and recover a single tablespace for the **MINITPCH** PDB to a prior point in time, effectively resetting it after development or testing efforts.

```
RMAN> run{
   RECOVER TABLESPACE minitpch:users UN-
TIL TIME
   "TO_DATE('15-FEB-2022 06:00:00','DD-
MON-YYYY HH24:MI:SS')"
   AUXILIARY DESTINATION '+DATAC1';
}
```

Figure 23. Recovering a single tablespace to a prior point in time

Special Recovery Situations

Finally, we review two special recovery situations that, while quite unlikely, are non-trivial to solve without careful consideration.

Recover Lost or Damaged SPFILE

As previously noted, this is also an extremely unlikely occurrence in any environment and would likely be the result of human error. Again, we include it here simply to demonstrate the capabilities of the Veeam Plug-in *for Oracle RMAN*.

```
RMAN> restore spfile to '+DATAC1/DB01/
PARAMETERFILE/spfile.272.1091973629';
```

Figure 24. Recovering from the loss of the database's SPFILE

Recover Lost CONTROLFILE (when all current copies lost)

If best practices have been carefully followed, this should be an extremely rare occurrence in any environment, and incredibly unlikely in a robust enterprise environment like an Exadata DBM. However, we include it here for completeness of demonstrating the capabilities of the Veeam Plug-in *for Oracle RMAN*.

```
RMAN> restore controlfile;
```

Figure 25. Recovering from the loss of all current copies of the database's control file

Conclusions

After thoroughly investigating and experimenting with numerous backup and recovery scenarios, our team found that Veeam Backup & Replication and the Veeam Plug-in *for Oracle RMAN* was an excellent option for guaranteeing database continuity, especially when paired with an Oracle Exadata environment.

Simple configuration. Setting up the Veeam Plug-in on each node of our Exadata DBM took only a matter of minutes, required no additional RPMs to be installed and automatically configured our database's RMAN parameter settings for optimum throughput. It also automatically allocated an appropriate number of RMAN I/O channels based on the observed capabilities and capacities of the underlying two-node RAC Oracle 19*c* database.

Integrated database backups. Once the Veeam Plug-in was configured, it was a simple matter to initiate any of our nine scenarios for backing up our database's key components. A key feature was its ability to leverage Oracle 19*c*'s capability to back up a single pluggable database (PDB) within its corresponding container database (CDB). As Oracle shifts its support policy to multi-tenant databases in later releases, this ability will be crucial for shops that need to back up many PDBs simultaneously — say, for a production, test and development PDB within the same CDB — at different frequencies as necessary.

Simpler database recovery. The whole point of backups, of course, is to be able to restore and recover databases and their components — whether that means an entire CDB, multiple PDBs within a CDB or even a single tablespace set for a specific PDB — to either the *current* point in time (complete recovery, which is the most common scenario) as well as to a *prior* point in time (incomplete recovery, which is rarer in production, but not unheard of for development and testing environments). The Veeam Plug-in handled all identified database recovery scenarios seamlessly through its interface with RMAN.

A single pane of glass. Finally, Veeam's graphic interface for Veeam Backup & Replication made short the work of tracking the status of all backup files across both CDBs and PDBs, made it simple to monitor regularly scheduled backup tasks and initiate any type of required database recovery effort from a single platform and common interface, regardless of the fact that the same Veeam repository also managed backups for other RDBMSs like SQL Server. This single pane of glass provides excellent visibility for both an experienced Oracle DBA as well as a relative newcomer to Oracle backup and recovery scenarios and strategies.

Authors

Dean Bolton launched his IT career in 2000 after completing his bachelor›s degree in computer science and engineering at the Massachusetts Institute of Technology. He started working with Oracle databases from the beginning at an internet systems and applications design firm. Since then, he has continued working as an Oracle developer, database administrator, architect, consultant and evangelist.

Today, Dean is the managing partner of VLSS LLC, a premier Oracle and VMware consulting firm. He serves as the lead enterprise architect with a focus on Oracle applications and database solutions. Dean is an Oracle 12c DBA Certified Master, Exadata Specialist, Oracle ACE and VMware vExpert.

Jim Czuprynski has over 40 years of professional experience in Information Technology, serving diverse roles at various Fortune 1000 companies before becoming an Oracle DBA in 2001. In his five-plus years as one of the top instructors for Oracle University, he trained over 2,000 DBAs in basic database administration, backup and recovery, and performance tuning for single-instance and Real Application Cluster databases, as well as 200 DBMAs in the minutiae of Exadata Database Machine management techniques.

Jim has been an Oracle ACE Director since 2014 and is a sought-after public speaker on Oracle technology, presenting often at Oracle OpenWorld, Oracle CODE, COLLABORATE, KSCOPE, Oracle Development Community tours and Oracle User Group conferences around the world. He has authored 100+ articles on Oracle Database administration, ML/analytics and APEX since 2003 at databasejournal.com, IOUG SELECT and ODTUG TechCeleration. He has co-authored four books on Oracle database technology.

Joey D'Antoni is a Principal Consultant at Denny Cherry and Associates Consulting. He is recognized as a VMware vExpert, a Microsoft Data Platform MVP and has over 20 years of experience working in both Fortune 500 and smaller firms. He has worked extensively on database platforms and cloud technologies and has specific expertise in performance tuning, infrastructure and disaster recovery

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Appendix A: RMAN Output Logs

Backup Scenarios

Scenario 5.1: Full Database Backup

Recovery Manager: Release 21.0.0.0.0 — Production on Sun Feb 13 14:16:40 2022

Version 21.4.0.0.0

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connected to target database: DB01 (DBID=1723239724)

```
RMAN> backup database tag 'VLSS 5.1';

Starting backup at 13-FEB-22

using target database control file instead of recovery catalog

allocated channel: ORA_SBT_TAPE_1

channel ORA_SBT_TAPE_1: SID=2375 instance=db011 device type=SBT_TAPE

channel ORA_SBT_TAPE_1: Veeam Plug-in for Oracle RMAN

allocated channel: ORA_SBT_TAPE_2

channel ORA_SBT_TAPE_2: SID=2544 instance=db011 device type=SBT_TAPE

channel ORA_SBT_TAPE_2: Veeam Plug-in for Oracle RMAN

allocated channel: ORA_SBT_TAPE_3

channel ORA_SBT_TAPE_3: SID=2720 instance=db011 device type=SBT_TAPE

channel ORA_SBT_TAPE_3: Veeam Plug-in for Oracle RMAN

allocated channel: ORA_SBT_TAPE_4

channel ORA_SBT_TAPE_4: SID=2803 instance=db011 device type=SBT_TAPE

channel ORA_SBT_TAPE_4: Veeam Plug-in for Oracle RMAN

channel ORA_SBT_TAPE_1: starting full datafile backup set

channel ORA_SBT_TAPE_1: specifying datafile(s) in backup set

input datafile file number=00025 name=+DATAC1/DB01/D487A74818F3198DE0530C7219ACE40E/DATAFILE/tpch_
data.290.1092942481

input datafile file number=00024 name=+DATAC1/DB01/D487A74818F3198DE0530C7219ACE40E/DATAFILE/undo_2.289.1092942359

channel ORA_SBT_TAPE_1: starting piece 1 at 13-FEB-22

channel ORA_SBT_TAPE_2: starting full datafile backup set

channel ORA_SBT_TAPE_2: specifying datafile(s) in backup set

input datafile file number=00026 name=+DATAC1/DB01/D487A74818F3198DE0530C7219ACE40E/DATAFILE/tpch_
idx.291.1092942487

input datafile file number=00020 name=+DATAC1/DB01/D487A74818F3198DE0530C7219ACE40E/DATAFILE/undotbs1.284.1092845715

channel ORA_SBT_TAPE_2: starting piece 1 at 13-FEB-22

channel ORA_SBT_TAPE_3: starting full datafile backup set

channel ORA_SBT_TAPE_3: specifying datafile(s) in backup set

input datafile file number=00003 name=+DATAC1/DB01/DATAFILE/sysaux.262.1091971713

input datafile file number=00007 name=+DATAC1/DB01/DATAFILE/undotbs2.268.1091971729

channel ORA_SBT_TAPE_3: starting piece 1 at 13-FEB-22
```

```
channel ORA_SBT_TAPE_4: starting full datafile backup set

channel ORA_SBT_TAPE_4: specifying datafile(s) in backup set

input datafile file number=00001 name=+DATAC1/DB01/DATAFILE/system.260.1091971711

input datafile file number=00008 name=+DATAC1/DB01/DATAFILE/users.269.1091971731

channel ORA_SBT_TAPE_4: starting piece 1 at 13-FEB-22

channel ORA_SBT_TAPE_3: finished piece 1 at 13-FEB-22

piece handle=850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_DB01_20220213_2a0lo5aj_74_1_1.vab tag=VLSS
5.1 comment=API Version 2.0,MMS Version 11.0.1.237

channel ORA_SBT_TAPE_3: backup set complete, elapsed time: 00:00:55

channel ORA_SBT_TAPE_3: starting full datafile backup set

channel ORA_SBT_TAPE_3: specifying datafile(s) in backup set

input datafile file number=00005 name=+DATAC1/DB01/DATAFILE/undotbs1.264.1091971715

channel ORA_SBT_TAPE_3: starting piece 1 at 13-FEB-22

channel ORA_SBT_TAPE_4: finished piece 1 at 13-FEB-22

piece handle=850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_DB01_20220213_2b0lo5aj_75_1_1.vab tag=VLSS
5.1 comment=API Version 2.0,MMS Version 11.0.1.237

channel ORA_SBT_TAPE_4: backup set complete, elapsed time: 00:00:55

channel ORA_SBT_TAPE_4: starting full datafile backup set

channel ORA_SBT_TAPE_4: specifying datafile(s) in backup set

input datafile file number=00022 name=+DATAC1/DB01/D487A74818F1198DE0530C7219ACE40E/DATAFILE/tpch_
data.287.1092940189

input datafile file number=00023 name=+DATAC1/DB01/D487A74818F1198DE0530C7219ACE40E/DATAFILE/tpch_
idx.288.1092940191

channel ORA_SBT_TAPE_4: starting piece 1 at 13-FEB-22

channel ORA_SBT_TAPE_3: finished piece 1 at 13-FEB-22

piece handle=850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_DB01_20220213_2c0lo5ca_76_1_1.vab tag=VLSS
5.1 comment=API Version 2.0,MMS Version 11.0.1.237

channel ORA_SBT_TAPE_3: backup set complete, elapsed time: 00:00:56

channel ORA_SBT_TAPE_3: starting full datafile backup set

channel ORA_SBT_TAPE_3: specifying datafile(s) in backup set

input datafile file number=00015 name=+DATAC1/DB01/D487A74818F1198DE0530C7219ACE40E/DATAFILE/system.278.1092845693

input datafile file number=00017 name=+DATAC1/DB01/D487A74818F1198DE0530C7219ACE40E/DATAFILE/undotbs1.280.1092845693

channel ORA_SBT_TAPE_3: starting piece 1 at 13-FEB-22

channel ORA_SBT_TAPE_3: finished piece 1 at 13-FEB-22

piece handle=850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_DB01_20220213_2e0lo5e2_78_1_1.vab tag=VLSS
5.1 comment=API Version 2.0,MMS Version 11.0.1.237

channel ORA_SBT_TAPE_3: backup set complete, elapsed time: 00:00:25

channel ORA_SBT_TAPE_3: starting full datafile backup set

channel ORA_SBT_TAPE_3: specifying datafile(s) in backup set

input datafile file number=00016 name=+DATAC1/DB01/D487A74818F1198DE0530C7219ACE40E/DATAFILE/sysaux.279.1092845693

input datafile file number=00021 name=+DATAC1/DB01/D487A74818F1198DE0530C7219ACE40E/DATAFILE/undo_2.286.1092938511

channel ORA_SBT_TAPE_3: starting piece 1 at 13-FEB-22

channel ORA_SBT_TAPE_3: finished piece 1 at 13-FEB-22

piece handle=850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_DB01_20220213_2f0lo5er_79_1_1.vab tag=VLSS
5.1 comment=API Version 2.0,MMS Version 11.0.1.237

channel ORA_SBT_TAPE_3: backup set complete, elapsed time: 00:00:35
```

```
channel ORA_SBT_TAPE_3: starting full datafile backup set

channel ORA_SBT_TAPE_3: specifying datafile(s) in backup set

input datafile file number=00018 name=+DATAC1/DB01/D487A74818F3198DE0530C7219ACE40E/DATAFILE/system.282.1092845715

input datafile file number=00019 name=+DATAC1/DB01/D487A74818F3198DE0530C7219ACE40E/DATAFILE/sysaux.283.1092845715

channel ORA_SBT_TAPE_3: starting piece 1 at 13-FEB-22

channel ORA_SBT_TAPE_4: finished piece 1 at 13-FEB-22

piece handle=850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_DB01_20220213_2d0lo5cb_77_1_1.vab tag=VLSS
5.1 comment=API Version 2.0,MMS Version 11.0.1.237

channel ORA_SBT_TAPE_4: backup set complete, elapsed time: 00:01:55

channel ORA_SBT_TAPE_4: starting full datafile backup set

channel ORA_SBT_TAPE_4: specifying datafile(s) in backup set

input datafile file number=00002 name=+DATAC1/DB01/D3BC41554351C1D3E0530B7219ACCE32/DATAFILE/system.261.1091971711

channel ORA_SBT_TAPE_4: starting piece 1 at 13-FEB-22

channel ORA_SBT_TAPE_3: finished piece 1 at 13-FEB-22

piece handle=850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_DB01_20220213_2g0lo5fu_80_1_1.vab tag=VLSS
5.1 comment=API Version 2.0,MMS Version 11.0.1.237

channel ORA_SBT_TAPE_3: backup set complete, elapsed time: 00:00:25

channel ORA_SBT_TAPE_3: starting full datafile backup set

channel ORA_SBT_TAPE_3: specifying datafile(s) in backup set

input datafile file number=00004 name=+DATAC1/DB01/D3BC41554351C1D3E0530B7219ACCE32/DATAFILE/sysaux.263.1091971715

channel ORA_SBT_TAPE_3: starting piece 1 at 13-FEB-22

channel ORA_SBT_TAPE_4: finished piece 1 at 13-FEB-22

piece handle=850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_DB01_20220213_2h0lo5fu_81_1_1.vab tag=VLSS
5.1 comment=API Version 2.0,MMS Version 11.0.1.237

channel ORA_SBT_TAPE_4: backup set complete, elapsed time: 00:00:32

channel ORA_SBT_TAPE_4: starting full datafile backup set

channel ORA_SBT_TAPE_4: specifying datafile(s) in backup set

input datafile file number=00006 name=+DATAC1/DB01/D3BC41554351C1D3E0530B7219ACCE32/DATAFILE/undotbs1.265.1091971717

channel ORA_SBT_TAPE_4: starting piece 1 at 13-FEB-22

channel ORA_SBT_TAPE_3: finished piece 1 at 13-FEB-22

piece handle=850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_DB01_20220213_2i0lo5gn_82_1_1.vab tag=VLSS
5.1 comment=API Version 2.0,MMS Version 11.0.1.237

channel ORA_SBT_TAPE_3: backup set complete, elapsed time: 00:00:32

channel ORA_SBT_TAPE_4: finished piece 1 at 13-FEB-22

piece handle=850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_DB01_20220213_2j0lo5gu_83_1_1.vab tag=VLSS
5.1 comment=API Version 2.0,MMS Version 11.0.1.237

channel ORA_SBT_TAPE_4: backup set complete, elapsed time: 00:00:35

channel ORA_SBT_TAPE_2: finished piece 1 at 13-FEB-22

piece handle=850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_DB01_20220213_290lo5aj_73_1_1.vab tag=VLSS
5.1 comment=API Version 2.0,MMS Version 11.0.1.237

channel ORA_SBT_TAPE_2: backup set complete, elapsed time: 00:14:08

channel ORA_SBT_TAPE_1: finished piece 1 at 13-FEB-22

piece handle=850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_DB01_20220213_280lo5aj_72_1_1.vab tag=VLSS
5.1 comment=API Version 2.0,MMS Version 11.0.1.237

channel ORA_SBT_TAPE_1: backup set complete, elapsed time: 00:19:59

Finished backup at 13-FEB-22


Starting Control File and SPFILE Autobackup at 13-FEB-22

piece handle=c-1723239724-20220213-01_RMAN_AUTOBACKUP.vab comment=API Version 2.0,MMS Version 11.0.1.237

Finished Control File and SPFILE Autobackup at 13-FEB-22
```

Scenario 5.2: Full PDB Backup

Recovery Manager: Release 21.0.0.0.0 — Production on Sun Feb 13 13:54:55 2022

Version 21.4.0.0.0

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connected to target database: DB01 (DBID=1723239724)

```
RMAN> backup pluggable database MINITPCH tag 'VLSS 5.2';

Starting backup at 13-FEB-22

using target database control file instead of recovery catalog

allocated channel: ORA_SBT_TAPE_1

channel ORA_SBT_TAPE_1: SID=2544 instance=db011 device type=SBT_TAPE

channel ORA_SBT_TAPE_1: Veeam Plug-in for Oracle RMAN

allocated channel: ORA_SBT_TAPE_2

channel ORA_SBT_TAPE_2: SID=2720 instance=db011 device type=SBT_TAPE

channel ORA_SBT_TAPE_2: Veeam Plug-in for Oracle RMAN

allocated channel: ORA_SBT_TAPE_3

channel ORA_SBT_TAPE_3: SID=2803 instance=db011 device type=SBT_TAPE

channel ORA_SBT_TAPE_3: Veeam Plug-in for Oracle RMAN

allocated channel: ORA_SBT_TAPE_4

channel ORA_SBT_TAPE_4: SID=2894 instance=db011 device type=SBT_TAPE

channel ORA_SBT_TAPE_4: Veeam Plug-in for Oracle RMAN

channel ORA_SBT_TAPE_1: starting full datafile backup set

channel ORA_SBT_TAPE_1: specifying datafile(s) in backup set

input datafile file number=00022 name=+DATAC1/DB01/D487A74818F1198DE0530C7219ACE40E/DATAFILE/tpch_
data.287.1092940189

input datafile file number=00023 name=+DATAC1/DB01/D487A74818F1198DE0530C7219ACE40E/DATAFILE/tpch_
idx.288.1092940191

channel ORA_SBT_TAPE_1: starting piece 1 at 13-FEB-22

channel ORA_SBT_TAPE_2: starting full datafile backup set

channel ORA_SBT_TAPE_2: specifying datafile(s) in backup set

input datafile file number=00015 name=+DATAC1/DB01/D487A74818F1198DE0530C7219ACE40E/DATAFILE/system.278.1092845693

input datafile file number=00017 name=+DATAC1/DB01/D487A74818F1198DE0530C7219ACE40E/DATAFILE/un-
dotbs1.280.1092845693

channel ORA_SBT_TAPE_2: starting piece 1 at 13-FEB-22

channel ORA_SBT_TAPE_3: starting full datafile backup set

channel ORA_SBT_TAPE_3: specifying datafile(s) in backup set

input datafile file number=00016 name=+DATAC1/DB01/D487A74818F1198DE0530C7219ACE40E/DATAFILE/sys-
aux.279.1092845693

input datafile file number=00021 name=+DATAC1/DB01/D487A74818F1198DE0530C7219ACE40E/DATAFILE/undo_2.286.1092938511

channel ORA_SBT_TAPE_3: starting piece 1 at 13-FEB-22

channel ORA_SBT_TAPE_2: finished piece 1 at 13-FEB-22

piece handle=850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_DB01_20220213_1q0lo41o_58_1_1.vab tag=VLSS
5.2 comment=API Version 2.0,MMS Version 11.0.1.237

channel ORA_SBT_TAPE_2: backup set complete, elapsed time: 00:00:25

channel ORA_SBT_TAPE_3: finished piece 1 at 13-FEB-22
```

```
piece handle=850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_DB01_20220213_1r0lo41o_59_1_1.vab tag=VLSS
5.2 comment=API Version 2.0,MMS Version 11.0.1.237

channel ORA_SBT_TAPE_3: backup set complete, elapsed time: 00:00:45

channel ORA_SBT_TAPE_1: finished piece 1 at 13-FEB-22

piece handle=850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_DB01_20220213_1p0lo41o_57_1_1.vab tag=VLSS
5.2 comment=API Version 2.0,MMS Version 11.0.1.237

channel ORA_SBT_TAPE_1: backup set complete, elapsed time: 00:01:55

Finished backup at 13-FEB-22


Starting Control File and SPFILE Autobackup at 13-FEB-22

piece handle=c-1723239724-20220213-00_RMAN_AUTOBACKUP.vab comment=API Version 2.0,MMS Version 11.0.1.237

Finished Control File and SPFILE Autobackup at 13-FEB-22
```

Scenario 5.3: Tablespace Set Backup

Recovery Manager: Release 21.0.0.0.0 — Production on Sun Feb 13 14:44:05 2022

Version 21.4.0.0.0

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connected to target database: DB01 (DBID=1723239724)


```
RMAN> backup tablespace MINITPCH:TPCH_DATA,MINITPCH:TPCH_IDX tag 'VLSS 5.3';

Starting backup at 2022/02/13 14:44:11

using target database control file instead of recovery catalog

allocated channel: ORA_SBT_TAPE_1

channel ORA_SBT_TAPE_1: SID=2544 instance=db011 device type=SBT_TAPE

channel ORA_SBT_TAPE_1: Veeam Plug-in for Oracle RMAN

allocated channel: ORA_SBT_TAPE_2

channel ORA_SBT_TAPE_2: SID=2720 instance=db011 device type=SBT_TAPE

channel ORA_SBT_TAPE_2: Veeam Plug-in for Oracle RMAN

allocated channel: ORA_SBT_TAPE_3

channel ORA_SBT_TAPE_3: SID=2803 instance=db011 device type=SBT_TAPE

channel ORA_SBT_TAPE_3: Veeam Plug-in for Oracle RMAN

allocated channel: ORA_SBT_TAPE_4

channel ORA_SBT_TAPE_4: SID=2894 instance=db011 device type=SBT_TAPE

channel ORA_SBT_TAPE_4: Veeam Plug-in for Oracle RMAN

channel ORA_SBT_TAPE_1: starting full datafile backup set

channel ORA_SBT_TAPE_1: specifying datafile(s) in backup set

input datafile file number=00022 name=+DATAC1/DB01/D487A74818F1198DE0530C7219ACE40E/DATAFILE/tpch_
data.287.1092940189

channel ORA_SBT_TAPE_1: starting piece 1 at 2022/02/13 14:44:13

channel ORA_SBT_TAPE_2: starting full datafile backup set

channel ORA_SBT_TAPE_2: specifying datafile(s) in backup set

input datafile file number=00023 name=+DATAC1/DB01/D487A74818F1198DE0530C7219ACE40E/DATAFILE/tpch_
idx.288.1092940191
```

```
channel ORA_SBT_TAPE_2: starting piece 1 at 2022/02/13 14:44:13

channel ORA_SBT_TAPE_2: finished piece 1 at 2022/02/13 14:44:48

piece handle=850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_DB01_20220213_2m0lo6tt_86_1_1.vab tag=VLSS
5.3 comment=API Version 2.0,MMS Version 11.0.1.237

channel ORA_SBT_TAPE_2: backup set complete, elapsed time: 00:00:35

channel ORA_SBT_TAPE_1: finished piece 1 at 2022/02/13 14:45:18

piece handle=850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_DB01_20220213_2l0lo6tt_85_1_1.vab tag=VLSS
5.3 comment=API Version 2.0,MMS Version 11.0.1.237

channel ORA_SBT_TAPE_1: backup set complete, elapsed time: 00:01:05

Finished backup at 2022/02/13 14:45:18


Starting Control File and SPFILE Autobackup at 2022/02/13 14:45:18

piece handle=c-1723239724-20220213-02_RMAN_AUTOBACKUP.vab comment=API Version 2.0,MMS Version 11.0.1.237

Finished Control File and SPFILE Autobackup at 2022/02/13 14:45:25
```

Scenario 5.4: Single Tablespace Backup

Recovery Manager: Release 21.0.0.0.0 — Production on Sun Feb 13 14:51:11 2022

Version 21.4.0.0.0

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connected to target database: DB01 (DBID=1723239724)


```
RMAN> backup tablespace MINITPCH:TPCH_IDX tag 'VLSS 5.4';

Starting backup at 2022/02/13 14:51:17

using target database control file instead of recovery catalog

allocated channel: ORA_SBT_TAPE_1

channel ORA_SBT_TAPE_1: SID=1039 instance=db011 device type=SBT_TAPE

channel ORA_SBT_TAPE_1: Veeam Plug-in for Oracle RMAN

allocated channel: ORA_SBT_TAPE_2

channel ORA_SBT_TAPE_2: SID=5 instance=db011 device type=SBT_TAPE

channel ORA_SBT_TAPE_2: Veeam Plug-in for Oracle RMAN

allocated channel: ORA_SBT_TAPE_3

channel ORA_SBT_TAPE_3: SID=96 instance=db011 device type=SBT_TAPE

channel ORA_SBT_TAPE_3: Veeam Plug-in for Oracle RMAN

allocated channel: ORA_SBT_TAPE_4

channel ORA_SBT_TAPE_4: SID=183 instance=db011 device type=SBT_TAPE

channel ORA_SBT_TAPE_4: Veeam Plug-in for Oracle RMAN

channel ORA_SBT_TAPE_1: starting full datafile backup set

channel ORA_SBT_TAPE_1: specifying datafile(s) in backup set

input datafile file number=00023 name=+DATAC1/DB01/D487A74818F1198DE0530C7219ACE40E/DATAFILE/tpch_
idx.288.1092940191

channel ORA_SBT_TAPE_1: starting piece 1 at 2022/02/13 14:51:20

channel ORA_SBT_TAPE_1: finished piece 1 at 2022/02/13 14:52:05

piece handle=850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_DB01_20220213_2o0lo7b8_88_1_1.vab tag=VLSS
5.4 comment=API Version 2.0,MMS Version 11.0.1.237
```

```
channel ORA_SBT_TAPE_1: backup set complete, elapsed time: 00:00:45

Finished backup at 2022/02/13 14:52:05


Starting Control File and SPFILE Autobackup at 2022/02/13 14:52:05

piece handle=c-1723239724-20220213-03_RMAN_AUTOBACKUP.vab comment=API Version 2.0,MMS Version 11.0.1.237

Finished Control File and SPFILE Autobackup at 2022/02/13 14:52:12
```

Scenario 5.5: Multi-Piece Backup

Recovery Manager: Release 21.0.0.0.0 — Production on Sun Feb 13 17:47:23 2022

Version 21.4.0.0.0

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connected to target database: DB01 (DBID=1723239724)


```
RMAN> backup tablespace MINITPCH:TPCH_IDX SECTION SIZE 1G tag 'VLSS 5.5';

Starting backup at 2022/02/13 17:47:30

using target database control file instead of recovery catalog

allocated channel: ORA_SBT_TAPE_1

channel ORA_SBT_TAPE_1: SID=782 instance=db011 device type=SBT_TAPE

channel ORA_SBT_TAPE_1: Veeam Plug-in for Oracle RMAN

allocated channel: ORA_SBT_TAPE_2

channel ORA_SBT_TAPE_2: SID=1039 instance=db011 device type=SBT_TAPE

channel ORA_SBT_TAPE_2: Veeam Plug-in for Oracle RMAN

allocated channel: ORA_SBT_TAPE_3

channel ORA_SBT_TAPE_3: SID=5 instance=db011 device type=SBT_TAPE

channel ORA_SBT_TAPE_3: Veeam Plug-in for Oracle RMAN

allocated channel: ORA_SBT_TAPE_4

channel ORA_SBT_TAPE_4: SID=94 instance=db011 device type=SBT_TAPE

channel ORA_SBT_TAPE_4: Veeam Plug-in for Oracle RMAN

channel ORA_SBT_TAPE_1: starting full datafile backup set

channel ORA_SBT_TAPE_1: specifying datafile(s) in backup set

input datafile file number=00023 name=+DATAC1/DB01/D487A74818F1198DE0530C7219ACE40E/DATAFILE/tpch_
idx.288.1092940191

backing up blocks 1 through 131072

channel ORA_SBT_TAPE_1: starting piece 1 at 2022/02/13 17:47:33

channel ORA_SBT_TAPE_2: starting full datafile backup set

channel ORA_SBT_TAPE_2: specifying datafile(s) in backup set

input datafile file number=00023 name=+DATAC1/DB01/D487A74818F1198DE0530C7219ACE40E/DATAFILE/tpch_
idx.288.1092940191

backing up blocks 131073 through 262144

channel ORA_SBT_TAPE_2: starting piece 2 at 2022/02/13 17:47:33

channel ORA_SBT_TAPE_3: starting full datafile backup set

channel ORA_SBT_TAPE_3: specifying datafile(s) in backup set
```

```
input datafile file number=00023 name=+DATAC1/DB01/D487A74818F1198DE0530C7219ACE40E/DATAFILE/tpch_
idx.288.1092940191

backing up blocks 262145 through 393216

channel ORA_SBT_TAPE_3: starting piece 3 at 2022/02/13 17:47:33

channel ORA_SBT_TAPE_4: starting full datafile backup set

channel ORA_SBT_TAPE_4: specifying datafile(s) in backup set

input datafile file number=00023 name=+DATAC1/DB01/D487A74818F1198DE0530C7219ACE40E/DATAFILE/tpch_
idx.288.1092940191

backing up blocks 393217 through 524288

channel ORA_SBT_TAPE_4: starting piece 4 at 2022/02/13 17:47:33

channel ORA_SBT_TAPE_1: finished piece 1 at 2022/02/13 17:48:38

piece handle=850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_DB01_20220213_2q0lohll_90_1_1.vab tag=VLSS
5.5 comment=API Version 2.0,MMS Version 11.0.1.237

channel ORA_SBT_TAPE_1: backup set complete, elapsed time: 00:01:05

channel ORA_SBT_TAPE_1: starting full datafile backup set

channel ORA_SBT_TAPE_1: specifying datafile(s) in backup set

input datafile file number=00023 name=+DATAC1/DB01/D487A74818F1198DE0530C7219ACE40E/DATAFILE/tpch_
idx.288.1092940191

backing up blocks 524289 through 576768

channel ORA_SBT_TAPE_1: starting piece 5 at 2022/02/13 17:48:38

channel ORA_SBT_TAPE_2: finished piece 2 at 2022/02/13 17:48:38

piece handle=850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_DB01_20220213_2q0lohll_90_2_1.vab tag=VLSS
5.5 comment=API Version 2.0,MMS Version 11.0.1.237

channel ORA_SBT_TAPE_2: backup set complete, elapsed time: 00:01:05

channel ORA_SBT_TAPE_3: finished piece 3 at 2022/02/13 17:48:38

piece handle=850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_DB01_20220213_2q0lohll_90_3_1.vab tag=VLSS
5.5 comment=API Version 2.0,MMS Version 11.0.1.237

channel ORA_SBT_TAPE_3: backup set complete, elapsed time: 00:01:05

channel ORA_SBT_TAPE_4: finished piece 4 at 2022/02/13 17:48:38

piece handle=850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_DB01_20220213_2q0lohll_90_4_1.vab tag=VLSS
5.5 comment=API Version 2.0,MMS Version 11.0.1.237

channel ORA_SBT_TAPE_4: backup set complete, elapsed time: 00:01:05

channel ORA_SBT_TAPE_1: finished piece 5 at 2022/02/13 17:48:53

piece handle=850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_DB01_20220213_2q0lohll_90_5_1.vab tag=VLSS
5.5 comment=API Version 2.0,MMS Version 11.0.1.237

channel ORA_SBT_TAPE_1: backup set complete, elapsed time: 00:00:15

Finished backup at 2022/02/13 17:48:53


Starting Control File and SPFILE Autobackup at 2022/02/13 17:48:53

piece handle=c-1723239724-20220213-04_RMAN_AUTOBACKUP.vab comment=API Version 2.0,MMS Version 11.0.1.237

Finished Control File and SPFILE Autobackup at 2022/02/13 17:49:01
```

Scenario 5.6: Single Datafile Backup

Recovery Manager: Release 21.0.0.0.0 — Production on Sun Feb 13 17:50:40 2022

Version 21.4.0.0.0

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connected to target database: DB01 (DBID=1723239724)

```
RMAN> backup datafile 1 tag 'VLSS 5.6';

Starting backup at 2022/02/13 17:50:55

using target database control file instead of recovery catalog

allocated channel: ORA_SBT_TAPE_1

channel ORA_SBT_TAPE_1: SID=782 instance=db011 device type=SBT_TAPE

channel ORA_SBT_TAPE_1: Veeam Plug-in for Oracle RMAN

allocated channel: ORA_SBT_TAPE_2

channel ORA_SBT_TAPE_2: SID=1039 instance=db011 device type=SBT_TAPE

channel ORA_SBT_TAPE_2: Veeam Plug-in for Oracle RMAN

allocated channel: ORA_SBT_TAPE_3

channel ORA_SBT_TAPE_3: SID=5 instance=db011 device type=SBT_TAPE

channel ORA_SBT_TAPE_3: Veeam Plug-in for Oracle RMAN

allocated channel: ORA_SBT_TAPE_4

channel ORA_SBT_TAPE_4: SID=96 instance=db011 device type=SBT_TAPE

channel ORA_SBT_TAPE_4: Veeam Plug-in for Oracle RMAN

channel ORA_SBT_TAPE_1: starting full datafile backup set

channel ORA_SBT_TAPE_1: specifying datafile(s) in backup set

input datafile file number=00001 name=+DATAC1/DB01/DATAFILE/system.260.1091971711

channel ORA_SBT_TAPE_1: starting piece 1 at 2022/02/13 17:50:58

channel ORA_SBT_TAPE_1: finished piece 1 at 2022/02/13 17:51:33

piece handle=850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_DB01_20220213_300lohs2_96_1_1.vab tag=VLSS
5.6 comment=API Version 2.0,MMS Version 11.0.1.237

channel ORA_SBT_TAPE_1: backup set complete, elapsed time: 00:00:35

Finished backup at 2022/02/13 17:51:33


Starting Control File and SPFILE Autobackup at 2022/02/13 17:51:33

piece handle=c-1723239724-20220213-05_RMAN_AUTOBACKUP.vab comment=API Version 2.0,MMS Version 11.0.1.237

Finished Control File and SPFILE Autobackup at 2022/02/13 17:51:40
```

Scenario 5.7: Archived Redologs Only Backup

Recovery Manager: Release 21.0.0.0.0 — Production on Sun Feb 13 17:53:43 2022

Version 21.4.0.0.0

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connected to target database: DB01 (DBID=1723239724)

```
RMAN> backup archivelog all not backed up delete all input tag 'VLSS 5.7';
Starting backup at 2022/02/13 17:53:49
current log archived
using target database control file instead of recovery catalog
allocated channel: ORA_SBT_TAPE_1
channel ORA_SBT_TAPE_1: SID=94 instance=db011 device type=SBT_TAPE
channel ORA_SBT_TAPE_1: Veeam Plug-in for Oracle RMAN
allocated channel: ORA_SBT_TAPE_2
channel ORA_SBT_TAPE_2: SID=183 instance=db011 device type=SBT_TAPE
channel ORA_SBT_TAPE_2: Veeam Plug-in for Oracle RMAN
allocated channel: ORA_SBT_TAPE_3
channel ORA_SBT_TAPE_3: SID=524 instance=db011 device type=SBT_TAPE
channel ORA_SBT_TAPE_3: Veeam Plug-in for Oracle RMAN
allocated channel: ORA_SBT_TAPE_4
channel ORA_SBT_TAPE_4: SID=1038 instance=db011 device type=SBT_TAPE
channel ORA_SBT_TAPE_4: Veeam Plug-in for Oracle RMAN
channel ORA_SBT_TAPE_1: starting archived log backup set
channel ORA_SBT_TAPE_1: specifying archived log(s) in backup set
input archived log thread=1 sequence=3 RECID=87 STAMP=1094895788
input archived log thread=2 sequence=6 RECID=10 STAMP=1092942766
input archived log thread=1 sequence=4 RECID=9 STAMP=1092941437
input archived log thread=1 sequence=5 RECID=12 STAMP=1092943349
input archived log thread=2 sequence=7 RECID=11 STAMP=1092943052
input archived log thread=2 sequence=8 RECID=13 STAMP=1092943367
input archived log thread=2 sequence=9 RECID=14 STAMP=1092943667
input archived log thread=1 sequence=6 RECID=16 STAMP=1092952700
input archived log thread=2 sequence=10 RECID=15 STAMP=1092944043
input archived log thread=2 sequence=11 RECID=17 STAMP=1092952724
input archived log thread=2 sequence=12 RECID=19 STAMP=1092964587
input archived log thread=1 sequence=7 RECID=18 STAMP=1092964546
input archived log thread=1 sequence=8 RECID=20 STAMP=1092964615
input archived log thread=1 sequence=9 RECID=21 STAMP=1092964683
input archived log thread=2 sequence=13 RECID=23 STAMP=1092965068
input archived log thread=1 sequence=10 RECID=22 STAMP=1092964751
input archived log thread=1 sequence=11 RECID=24 STAMP=1092965095
input archived log thread=1 sequence=12 RECID=25 STAMP=1092965159
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input archived log thread=2 sequence=14 RECID=27 STAMP=1093017596
input archived log thread=1 sequence=13 RECID=26 STAMP=1092965237
input archived log thread=1 sequence=14 RECID=28 STAMP=1093017614
channel ORA_SBT_TAPE_1: starting piece 1 at 2022/02/13 17:54:20
channel ORA_SBT_TAPE_2: starting archived log backup set
channel ORA_SBT_TAPE_2: specifying archived log(s) in backup set
input archived log thread=1 sequence=46 RECID=70 STAMP=1093045341
input archived log thread=1 sequence=47 RECID=72 STAMP=1093045803
input archived log thread=1 sequence=48 RECID=73 STAMP=1093046275
input archived log thread=2 sequence=26 RECID=75 STAMP=1093047191
input archived log thread=1 sequence=49 RECID=74 STAMP=1093046739
input archived log thread=1 sequence=50 RECID=76 STAMP=1093047211
input archived log thread=1 sequence=51 RECID=77 STAMP=1093047851
input archived log thread=2 sequence=27 RECID=79 STAMP=1093047962
input archived log thread=1 sequence=52 RECID=78 STAMP=1093047922
input archived log thread=1 sequence=53 RECID=80 STAMP=1093047989
input archived log thread=1 sequence=54 RECID=81 STAMP=1093048829
input archived log thread=2 sequence=28 RECID=83 STAMP=1094169563
input archived log thread=1 sequence=55 RECID=82 STAMP=1093738045
input archived log thread=1 sequence=56 RECID=84 STAMP=1094561913
input archived log thread=2 sequence=29 RECID=86 STAMP=1094894271
input archived log thread=1 sequence=57 RECID=85 STAMP=1094894265
input archived log thread=2 sequence=30 RECID=89 STAMP=1095857913
input archived log thread=1 sequence=58 RECID=88 STAMP=1095555514
input archived log thread=1 sequence=59 RECID=90 STAMP=1096232316
channel ORA_SBT_TAPE_2: starting piece 1 at 2022/02/13 17:54:20
channel ORA_SBT_TAPE_3: starting archived log backup set
channel ORA_SBT_TAPE_3: specifying archived log(s) in backup set
input archived log thread=1 sequence=15 RECID=29 STAMP=1093018662
input archived log thread=2 sequence=15 RECID=31 STAMP=1093031369
input archived log thread=1 sequence=16 RECID=30 STAMP=1093019043
input archived log thread=1 sequence=17 RECID=32 STAMP=1093031392
input archived log thread=1 sequence=18 RECID=33 STAMP=1093031966
input archived log thread=2 sequence=16 RECID=35 STAMP=1093033183
input archived log thread=1 sequence=19 RECID=34 STAMP=1093032706
input archived log thread=1 sequence=20 RECID=36 STAMP=1093033202
input archived log thread=1 sequence=21 RECID=37 STAMP=1093033690
input archived log thread=2 sequence=17 RECID=39 STAMP=1093034597
input archived log thread=1 sequence=22 RECID=38 STAMP=1093034158
input archived log thread=1 sequence=23 RECID=40 STAMP=1093034618
input archived log thread=1 sequence=24 RECID=41 STAMP=1093035082
input archived log thread=2 sequence=18 RECID=43 STAMP=1093036002
input archived log thread=1 sequence=25 RECID=42 STAMP=1093035558
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input archived log thread=1 sequence=26 RECID=44 STAMP=1093036020

input archived log thread=1 sequence=27 RECID=45 STAMP=1093036486

input archived log thread=2 sequence=19 RECID=47 STAMP=1093037407

input archived log thread=1 sequence=28 RECID=46 STAMP=1093036962

input archived log thread=1 sequence=29 RECID=48 STAMP=1093037424

input archived log thread=1 sequence=30 RECID=49 STAMP=1093037887

channel ORA_SBT_TAPE_3: starting piece 1 at 2022/02/13 17:54:20

channel ORA_SBT_TAPE_4: starting archived log backup set

channel ORA_SBT_TAPE_4: specifying archived log(s) in backup set

input archived log thread=2 sequence=20 RECID=51 STAMP=1093038797

input archived log thread=1 sequence=31 RECID=50 STAMP=1093038348

input archived log thread=1 sequence=32 RECID=52 STAMP=1093038816

input archived log thread=1 sequence=33 RECID=53 STAMP=1093039273

input archived log thread=2 sequence=21 RECID=55 STAMP=1093040175

input archived log thread=1 sequence=34 RECID=54 STAMP=1093039723

input archived log thread=1 sequence=35 RECID=56 STAMP=1093040194

input archived log thread=1 sequence=36 RECID=57 STAMP=1093040674

input archived log thread=2 sequence=22 RECID=59 STAMP=1093041589

input archived log thread=1 sequence=37 RECID=58 STAMP=1093041142

input archived log thread=1 sequence=38 RECID=60 STAMP=1093041606

input archived log thread=1 sequence=39 RECID=61 STAMP=1093042080

input archived log thread=2 sequence=23 RECID=63 STAMP=1093042991

input archived log thread=1 sequence=40 RECID=62 STAMP=1093042551

input archived log thread=1 sequence=41 RECID=64 STAMP=1093043011

input archived log thread=1 sequence=42 RECID=65 STAMP=1093043490

input archived log thread=2 sequence=24 RECID=67 STAMP=1093044414

input archived log thread=1 sequence=43 RECID=66 STAMP=1093043950

input archived log thread=1 sequence=44 RECID=68 STAMP=1093044433

input archived log thread=1 sequence=45 RECID=69 STAMP=1093044884

input archived log thread=2 sequence=25 RECID=71 STAMP=1093045786

channel ORA_SBT_TAPE_4: starting piece 1 at 2022/02/13 17:54:20

channel ORA_SBT_TAPE_4: finished piece 1 at 2022/02/13 18:02:55

piece handle=850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_DB01_20220213_350loi2c_101_1_1.vab
tag=VLSS 5.7 comment=API Version 2.0,MMS Version 11.0.1.237

channel ORA_SBT_TAPE_4: backup set complete, elapsed time: 00:08:35

channel ORA_SBT_TAPE_4: deleting archived log(s)

archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_01_03/thread_2_seq_20.329.1093038797 RECID=51 STAMP=1093038797

archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_01_03/thread_1_seq_31.327.1093038329 RECID=50 STAMP=1093038348

archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_01_03/thread_1_seq_32.328.1093038797 RECID=52 STAMP=1093038816

archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_01_03/thread_1_seq_33.330.1093039253 RECID=53 STAMP=1093039273

archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_01_03/thread_2_seq_21.333.1093040175 RECID=55 STAMP=1093040175

archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_01_03/thread_1_seq_34.331.1093039703 RECID=54 STAMP=1093039723

archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_01_03/thread_1_seq_35.332.1093040175 RECID=56 STAMP=1093040194
```

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archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_01_03/thread_1_seq_36.334.1093040655 RECID=57 STAMP=1093040674
archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_01_03/thread_2_seq_22.337.1093041589 RECID=59 STAMP=1093041589
archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_01_03/thread_1_seq_37.335.1093041123 RECID=58 STAMP=1093041142
archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_01_03/thread_1_seq_38.336.1093041587 RECID=60 STAMP=1093041606
archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_01_03/thread_1_seq_39.284.1093042061 RECID=61 STAMP=1093042080
archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_01_03/thread_2_seq_23.341.1093042991 RECID=63 STAMP=1093042991
archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_01_03/thread_1_seq_40.339.1093042533 RECID=62 STAMP=1093042551
archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_01_03/thread_1_seq_41.340.1093042991 RECID=64 STAMP=1093043011
archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_01_03/thread_1_seq_42.342.1093043471 RECID=65 STAMP=1093043490
archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_01_03/thread_2_seq_24.345.1093044415 RECID=67 STAMP=1093044414
archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_01_03/thread_1_seq_43.343.1093043931 RECID=66 STAMP=1093043950
archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_01_03/thread_1_seq_44.344.1093044413 RECID=68 STAMP=1093044433
archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_01_03/thread_1_seq_45.346.1093044867 RECID=69 STAMP=1093044884
archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_01_03/thread_2_seq_25.349.1093045787 RECID=71 STAMP=1093045786
channel ORA_SBT_TAPE_4: starting archived log backup set
channel ORA_SBT_TAPE_4: specifying archived log(s) in backup set
input archived log thread=2 sequence=31 RECID=92 STAMP=1096566856
input archived log thread=1 sequence=60 RECID=91 STAMP=1096566845
channel ORA_SBT_TAPE_4: starting piece 1 at 2022/02/13 18:02:57
channel ORA_SBT_TAPE_2: finished piece 1 at 2022/02/13 18:03:22
piece handle=850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_DB01_20220213_330loi2c_99_1_1.vab tag=VLSS
5.7 comment=API Version 2.0,MMS Version 11.0.1.237
channel ORA_SBT_TAPE_2: backup set complete, elapsed time: 00:09:02
channel ORA_SBT_TAPE_2: deleting archived log(s)
archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_01_03/thread_1_seq_46.347.1093045323 RECID=70 STAMP=1093045341
archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_01_03/thread_1_seq_47.348.1093045785 RECID=72 STAMP=1093045803
archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_01_03/thread_1_seq_48.350.1093046255 RECID=73 STAMP=1093046275
archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_01_04/thread_2_seq_26.353.1093047191 RECID=75 STAMP=1093047191
archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_01_04/thread_1_seq_49.351.1093046721 RECID=74 STAMP=1093046739
archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_01_04/thread_1_seq_50.352.1093047191 RECID=76 STAMP=1093047211
archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_01_04/thread_1_seq_51.354.1093047823 RECID=77 STAMP=1093047851
archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_01_04/thread_2_seq_27.357.1093047963 RECID=79 STAMP=1093047962
archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_01_04/thread_1_seq_52.355.1093047891 RECID=78 STAMP=1093047922
archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_01_04/thread_1_seq_53.356.1093047961 RECID=80 STAMP=1093047989
archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_01_04/thread_1_seq_54.358.1093048803 RECID=81 STAMP=1093048829
archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_01_16/thread_2_seq_28.308.1094169537 RECID=83 STAMP=1094169563
archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_01_12/thread_1_seq_55.359.1093738021 RECID=82 STAMP=1093738045
archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_01_21/thread_1_seq_56.295.1094561887 RECID=84 STAMP=1094561913
archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_01_25/thread_2_seq_29.283.1094894249 RECID=86 STAMP=1094894271
archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_01_25/thread_1_seq_57.278.1094894249 RECID=85 STAMP=1094894265
archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_02_05/thread_2_seq_30.338.1095857887 RECID=89 STAMP=1095857913
archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_02_02/thread_1_seq_58.361.1095555489 RECID=88 STAMP=1095555514
archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_02_09/thread_1_seq_59.362.1096232289 RECID=90 STAMP=1096232316
```

channel ORA_SBT_TAPE_3: finished piece 1 at 2022/02/13 18:03:33

piece handle=850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_DB01_20220213_340loi2c_100_1_1.vab
tag=VLSS 5.7 comment=API Version 2.0,MMS Version 11.0.1.237

channel ORA_SBT_TAPE_3: backup set complete, elapsed time: 00:09:13

channel ORA_SBT_TAPE_2: deleting archived log(s)

archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_01_03/thread_1_seq_15.306.1093018643 RECID=29
STAMP=1093018662

archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_01_03/thread_2_seq_15.309.1093031369 RECID=31 STAMP=1093031369

archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_01_03/thread_1_seq_16.307.1093019021 RECID=30 STAMP=1093019043

archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_01_03/thread_1_seq_17.277.1093031367 RECID=32 STAMP=1093031392

archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_01_03/thread_1_seq_18.310.1093031947 RECID=33 STAMP=1093031966

archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_01_03/thread_2_seq_16.313.1093033183 RECID=35 STAMP=1093033183

archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_01_03/thread_1_seq_19.311.1093032685 RECID=34 STAMP=1093032706

archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_01_03/thread_1_seq_20.312.1093033181 RECID=36 STAMP=1093033202

archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_01_03/thread_1_seq_21.314.1093033669 RECID=37 STAMP=1093033690

archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_01_03/thread_2_seq_17.317.1093034597 RECID=39 STAMP=1093034597

archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_01_03/thread_1_seq_22.315.1093034137 RECID=38 STAMP=1093034158

archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_01_03/thread_1_seq_23.316.1093034597 RECID=40 STAMP=1093034618

archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_01_03/thread_1_seq_24.318.1093035061 RECID=41 STAMP=1093035082

archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_01_03/thread_2_seq_18.321.1093036003 RECID=43 STAMP=1093036002

archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_01_03/thread_1_seq_25.319.1093035539 RECID=42 STAMP=1093035558

archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_01_03/thread_1_seq_26.320.1093036001 RECID=44 STAMP=1093036020

archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_01_03/thread_1_seq_27.322.1093036465 RECID=45 STAMP=1093036486

archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_01_03/thread_2_seq_19.325.1093037407 RECID=47 STAMP=1093037407

archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_01_03/thread_1_seq_28.323.1093036943 RECID=46 STAMP=1093036962

archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_01_03/thread_1_seq_29.324.1093037405 RECID=48 STAMP=1093037424

archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_01_03/thread_1_seq_30.326.1093037867 RECID=49 STAMP=1093037887

channel ORA_SBT_TAPE_1: finished piece 1 at 2022/02/13 18:03:44

piece handle=850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_DB01_20220213_320loi2b_98_1_1.vab tag=VLSS
5.7 comment=API Version 2.0,MMS Version 11.0.1.237

channel ORA_SBT_TAPE_1: backup set complete, elapsed time: 00:09:24

channel ORA_SBT_TAPE_1: deleting archived log(s)

archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_01_25/thread_1_seq_3.281.1094895779 RECID=87 STAMP=1094895788

archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_01_02/thread_2_seq_6.286.1092942741 RECID=10 STAMP=1092942766

archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_01_02/thread_1_seq_4.285.1092941413 RECID=9 STAMP=1092941437

archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_01_02/thread_1_seq_5.290.1092943347 RECID=12 STAMP=1092943349

archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_01_02/thread_2_seq_7.288.1092943029 RECID=11 STAMP=1092943052

archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_01_02/thread_2_seq_8.289.1092943345 RECID=13 STAMP=1092943367

archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_01_02/thread_2_seq_9.291.1092943647 RECID=14 STAMP=1092943667

archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_01_02/thread_1_seq_6.294.1092952701 RECID=16 STAMP=1092952700

archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_01_02/thread_2_seq_10.292.1092944023 RECID=15 STAMP=1092944043

archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_01_02/thread_2_seq_11.293.1092952699 RECID=17 STAMP=1092952724

archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_01_03/thread_2_seq_12.297.1092964587 RECID=19 STAMP=1092964587

archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_01_03/thread_1_seq_7.282.1092964517 RECID=18 STAMP=1092964546

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archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_01_03/thread_1_seq_8.296.1092964587 RECID=20 STAMP=1092964615

archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_01_03/thread_1_seq_9.298.1092964655 RECID=21 STAMP=1092964683

archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_01_03/thread_2_seq_13.301.1092965069 RECID=23 STAMP=1092965068

archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_01_03/thread_1_seq_10.299.1092964725 RECID=22 STAMP=1092964751

archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_01_03/thread_1_seq_11.300.1092965067 RECID=24 STAMP=1092965095

archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_01_03/thread_1_seq_12.302.1092965131 RECID=25 STAMP=1092965159

archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_01_03/thread_2_seq_14.305.1093017595 RECID=27 STAMP=1093017596

archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_01_03/thread_1_seq_13.303.1092965209 RECID=26 STAMP=1092965237

archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_01_03/thread_1_seq_14.304.1093017593 RECID=28 STAMP=1093017614

channel ORA_SBT_TAPE_4: finished piece 1 at 2022/02/13 18:03:45

piece handle=850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_DB01_20220213_3a0loiih_106_1_1.vab
tag=VLSS 5.7 comment=API Version 2.0,MMS Version 11.0.1.237

channel ORA_SBT_TAPE_4: backup set complete, elapsed time: 00:00:48

channel ORA_SBT_TAPE_1: deleting archived log(s)

archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_02_13/thread_2_seq_31.272.1096566833 RECID=92 STAMP=1096566856

archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_02_13/thread_1_seq_60.273.1096566829 RECID=91 STAMP=1096566845

Finished backup at 2022/02/13 18:03:45


Starting Control File and SPFILE Autobackup at 2022/02/13 18:03:45

piece handle=c-1723239724-20220213-08_RMAN_AUTOBACKUP.vab comment=API Version 2.0,MMS Version 11.0.1.237

Finished Control File and SPFILE Autobackup at 2022/02/13 18:03:52
```

Scenario 5.8: Control File Only Backup

Recovery Manager: Release 21.0.0.0.0 — Production on Sun Feb 13 17:58:12 2022

Version 21.4.0.0.0

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connected to target database: DB01 (DBID=1723239724)


```
RMAN> backup current controlfile tag 'VLSS 5.8';

Starting backup at 2022/02/13 17:58:18

using target database control file instead of recovery catalog

allocated channel: ORA_SBT_TAPE_1

channel ORA_SBT_TAPE_1: SID=1127 instance=db011 device type=SBT_TAPE

channel ORA_SBT_TAPE_1: Veeam Plug-in for Oracle RMAN

allocated channel: ORA_SBT_TAPE_2

channel ORA_SBT_TAPE_2: SID=1215 instance=db011 device type=SBT_TAPE

channel ORA_SBT_TAPE_2: Veeam Plug-in for Oracle RMAN

allocated channel: ORA_SBT_TAPE_3

channel ORA_SBT_TAPE_3: SID=1293 instance=db011 device type=SBT_TAPE

channel ORA_SBT_TAPE_3: Veeam Plug-in for Oracle RMAN

allocated channel: ORA_SBT_TAPE_4

channel ORA_SBT_TAPE_4: SID=1383 instance=db011 device type=SBT_TAPE
```

```
channel ORA_SBT_TAPE_4: Veeam Plug-in for Oracle RMAN

channel ORA_SBT_TAPE_1: starting full datafile backup set

channel ORA_SBT_TAPE_1: specifying datafile(s) in backup set

including current control file in backup set

channel ORA_SBT_TAPE_1: starting piece 1 at 2022/02/13 17:58:24

channel ORA_SBT_TAPE_1: finished piece 1 at 2022/02/13 17:58:39

piece handle=850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_DB01_20220213_360loi9t_102_1_1.vab
tag=VLSS 5.8 comment=API Version 2.0,MMS Version 11.0.1.237

channel ORA_SBT_TAPE_1: backup set complete, elapsed time: 00:00:15

Finished backup at 2022/02/13 17:58:39


Starting Control File and SPFILE Autobackup at 2022/02/13 17:58:39

piece handle=c-1723239724-20220213-06_RMAN_AUTOBACKUP.vab comment=API Version 2.0,MMS Version 11.0.1.237

Finished Control File and SPFILE Autobackup at 2022/02/13 17:58:46
```

Scenario 5.9: SPFILE-Only Backup

Recovery Manager: Release 21.0.0.0.0 — Production on Sun Feb 13 17:59:11 2022
Version 21.4.0.0.0
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connected to target database: DB01 (DBID=1723239724)


```
RMAN> backup spfile tag 'VLSS 5.9';

Starting backup at 2022/02/13 17:59:17

using target database control file instead of recovery catalog

allocated channel: ORA_SBT_TAPE_1

channel ORA_SBT_TAPE_1: SID=2287 instance=db011 device type=SBT_TAPE

channel ORA_SBT_TAPE_1: Veeam Plug-in for Oracle RMAN

allocated channel: ORA_SBT_TAPE_2

channel ORA_SBT_TAPE_2: SID=2375 instance=db011 device type=SBT_TAPE

channel ORA_SBT_TAPE_2: Veeam Plug-in for Oracle RMAN

allocated channel: ORA_SBT_TAPE_3

channel ORA_SBT_TAPE_3: SID=2544 instance=db011 device type=SBT_TAPE

channel ORA_SBT_TAPE_3: Veeam Plug-in for Oracle RMAN

allocated channel: ORA_SBT_TAPE_4

channel ORA_SBT_TAPE_4: SID=2720 instance=db011 device type=SBT_TAPE

channel ORA_SBT_TAPE_4: Veeam Plug-in for Oracle RMAN

channel ORA_SBT_TAPE_1: starting full datafile backup set

channel ORA_SBT_TAPE_1: specifying datafile(s) in backup set

including current SPFILE in backup set

channel ORA_SBT_TAPE_1: starting piece 1 at 2022/02/13 17:59:19

channel ORA_SBT_TAPE_1: finished piece 1 at 2022/02/13 18:00:05

piece handle=850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_DB01_20220213_380loibn_104_1_1.vab
tag=VLSS 5.9 comment=API Version 2.0,MMS Version 11.0.1.237
```

```
channel ORA_SBT_TAPE_1: backup set complete, elapsed time: 00:00:46

Finished backup at 2022/02/13 18:00:05


Starting Control File and SPFILE Autobackup at 2022/02/13 18:00:05

piece handle=c-1723239724-20220213-07_RMAN_AUTOBACKUP.vab comment=API Version 2.0,MMS Version 11.0.1.237

Finished Control File and SPFILE Autobackup at 2022/02/13 18:00:12
```

Restore & Recovery Scenarios

Scenario 6.1.1: Complete Recovery of CDB to Current Point-in-Time

Recovery Manager: Release 21.0.0.0.0 — Production on Mon Feb 14 05:12:46 2022

Version 21.4.0.0.0

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connected to target database (not started)

```
RMAN>

RMAN> startup mount;

Oracle instance started

database mounted


Total System Global Area   25735991616 bytes


Fixed Size                    33296704 bytes

Variable Size               9059696640 bytes

Database Buffers           16508780544 bytes

Redo Buffers                 134217728 bytes


RMAN> restore database;

Starting restore at 2022/02/14 05:13:37

using target database control file instead of recovery catalog

allocated channel: ORA_SBT_TAPE_1

channel ORA_SBT_TAPE_1: SID=1853 instance=db011 device type=SBT_TAPE

channel ORA_SBT_TAPE_1: Veeam Plug-in for Oracle RMAN

allocated channel: ORA_SBT_TAPE_2

channel ORA_SBT_TAPE_2: SID=1939 instance=db011 device type=SBT_TAPE

channel ORA_SBT_TAPE_2: Veeam Plug-in for Oracle RMAN

allocated channel: ORA_SBT_TAPE_3

channel ORA_SBT_TAPE_3: SID=2025 instance=db011 device type=SBT_TAPE

channel ORA_SBT_TAPE_3: Veeam Plug-in for Oracle RMAN

allocated channel: ORA_SBT_TAPE_4

channel ORA_SBT_TAPE_4: SID=2111 instance=db011 device type=SBT_TAPE

channel ORA_SBT_TAPE_4: Veeam Plug-in for Oracle RMAN
```

```
allocated channel: ORA_DISK_1

channel ORA_DISK_1: SID=2198 instance=db011 device type=DISK


skipping datafile 2; already restored to file +DATAC1/DB01/D3BC41554351C1D3E0530B7219ACCE32/DATAFILE/sys-
tem.261.1091971711

skipping datafile 4; already restored to file +DATAC1/DB01/D3BC41554351C1D3E0530B7219ACCE32/DATAFILE/sys-
aux.263.1091971715

skipping datafile 6; already restored to file +DATAC1/DB01/D3BC41554351C1D3E0530B7219ACCE32/DATAFILE/un-
dotbs1.265.1091971717

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 00008 to +DATAC1/DB01/DATAFILE/users.269.1091971731

channel ORA_SBT_TAPE_1: reading from backup piece 850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
DB01_20220213_2b0lo5aj_75_1_1.vab

channel ORA_SBT_TAPE_2: starting datafile backup set restore

channel ORA_SBT_TAPE_2: specifying datafile(s) to restore from backup set

channel ORA_SBT_TAPE_2: restoring datafile 00003 to +DATAC1/DB01/DATAFILE/sysaux.262.1091971713

channel ORA_SBT_TAPE_2: restoring datafile 00007 to +DATAC1/DB01/DATAFILE/undotbs2.268.1091971729

channel ORA_SBT_TAPE_2: reading from backup piece 850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
DB01_20220213_2a0lo5aj_74_1_1.vab

channel ORA_SBT_TAPE_3: starting datafile backup set restore

channel ORA_SBT_TAPE_3: specifying datafile(s) to restore from backup set

channel ORA_SBT_TAPE_3: restoring datafile 00005 to +DATAC1/DB01/DATAFILE/undotbs1.264.1091971715

channel ORA_SBT_TAPE_3: reading from backup piece 850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
DB01_20220213_2c0lo5ca_76_1_1.vab

channel ORA_SBT_TAPE_4: starting datafile backup set restore

channel ORA_SBT_TAPE_4: specifying datafile(s) to restore from backup set

channel ORA_SBT_TAPE_4: restoring datafile 00015 to +DATAC1/DB01/D487A74818F1198DE0530C7219ACE40E/DATAFILE/
system.278.1092845693

channel ORA_SBT_TAPE_4: restoring datafile 00017 to +DATAC1/DB01/D487A74818F1198DE0530C7219ACE40E/DATAFILE/
undotbs1.280.1092845693

channel ORA_SBT_TAPE_4: reading from backup piece 850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
DB01_20220213_2e0lo5e2_78_1_1.vab

channel ORA_SBT_TAPE_1: piece handle=850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
DB01_20220213_2b0lo5aj_75_1_1.vab tag=VLSS 5.1

channel ORA_SBT_TAPE_1: restored backup piece 1

channel ORA_SBT_TAPE_1: restore complete, elapsed time: 00:00:55

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 00016 to +DATAC1/DB01/D487A74818F1198DE0530C7219ACE40E/DATAFILE/
sysaux.279.1092845693

channel ORA_SBT_TAPE_1: restoring datafile 00021 to +DATAC1/DB01/D487A74818F1198DE0530C7219ACE40E/DATAFILE/
undo_2.286.1092938511

channel ORA_SBT_TAPE_1: reading from backup piece 850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
DB01_20220213_2f0lo5er_79_1_1.vab

channel ORA_SBT_TAPE_2: piece handle=850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
DB01_20220213_2a0lo5aj_74_1_1.vab tag=VLSS 5.1

channel ORA_SBT_TAPE_2: restored backup piece 1
```

```
channel ORA_SBT_TAPE_2: restore complete, elapsed time: 00:00:55

channel ORA_SBT_TAPE_2: starting datafile backup set restore

channel ORA_SBT_TAPE_2: specifying datafile(s) to restore from backup set

channel ORA_SBT_TAPE_2: restoring datafile 00018 to +DATAC1/DB01/D487A74818F3198DE0530C7219ACE40E/DATAFILE/
system.282.1092845715

channel ORA_SBT_TAPE_2: restoring datafile 00019 to +DATAC1/DB01/D487A74818F3198DE0530C7219ACE40E/DATAFILE/
sysaux.283.1092845715

channel ORA_SBT_TAPE_2: reading from backup piece 850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
DB01_20220213_2g0lo5fu_80_1_1.vab

channel ORA_SBT_TAPE_3: piece handle=850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_DB01_20220213_
2c0lo5ca_76_1_1.vab tag=VLSS 5.1

channel ORA_SBT_TAPE_3: restored backup piece 1

channel ORA_SBT_TAPE_3: restore complete, elapsed time: 00:00:55

channel ORA_SBT_TAPE_3: starting datafile backup set restore

channel ORA_SBT_TAPE_3: specifying datafile(s) to restore from backup set

channel ORA_SBT_TAPE_3: restoring datafile 00020 to +DATAC1/DB01/D487A74818F3198DE0530C7219ACE40E/DATAFILE/
undotbs1.284.1092845715

channel ORA_SBT_TAPE_3: restoring datafile 00026 to +DATAC1/DB01/D487A74818F3198DE0530C7219ACE40E/DATAFILE/
tpch_idx.291.1092942487

channel ORA_SBT_TAPE_3: reading from backup piece 850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
DB01_20220213_290lo5aj_73_1_1.vab

channel ORA_SBT_TAPE_4: piece handle=850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
DB01_20220213_2e0lo5e2_78_1_1.vab tag=VLSS 5.1

channel ORA_SBT_TAPE_4: restored backup piece 1

channel ORA_SBT_TAPE_4: restore complete, elapsed time: 00:00:55

channel ORA_SBT_TAPE_4: starting datafile backup set restore

channel ORA_SBT_TAPE_4: specifying datafile(s) to restore from backup set

channel ORA_SBT_TAPE_4: restoring datafile 00024 to +DATAC1/DB01/D487A74818F3198DE0530C7219ACE40E/DATAFILE/
undo_2.289.1092942359

channel ORA_SBT_TAPE_4: restoring datafile 00025 to +DATAC1/DB01/D487A74818F3198DE0530C7219ACE40E/DATAFILE/
tpch_data.290.1092942481

channel ORA_SBT_TAPE_4: reading from backup piece 850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
DB01_20220213_280lo5aj_72_1_1.vab

channel ORA_SBT_TAPE_1: piece handle=850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_DB01_20220213_
2f0lo5er_79_1_1.vab tag=VLSS 5.1

channel ORA_SBT_TAPE_1: restored backup piece 1

channel ORA_SBT_TAPE_1: restore complete, elapsed time: 00:00:15

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 00022 to +DATAC1/DB01/D487A74818F1198DE0530C7219ACE40E/DATAFILE/
tpch_data.287.1092940189

channel ORA_SBT_TAPE_1: reading from backup piece 850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
DB01_20220213_2l0lo6tt_85_1_1.vab

channel ORA_SBT_TAPE_2: piece handle=850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_DB01_20220213_
2g0lo5fu_80_1_1.vab tag=VLSS 5.1

channel ORA_SBT_TAPE_2: restored backup piece 1

channel ORA_SBT_TAPE_2: restore complete, elapsed time: 00:00:15

channel ORA_SBT_TAPE_2: starting datafile backup set restore

channel ORA_SBT_TAPE_2: specifying datafile(s) to restore from backup set
```

```
channel ORA_SBT_TAPE_2: restoring datafile 00023 to +DATAC1/DB01/D487A74818F1198DE0530C7219ACE40E/DATAFILE/
tpch_idx.288.1092940191

channel ORA_SBT_TAPE_2: restoring section 1 of 5

channel ORA_SBT_TAPE_2: reading from backup piece 850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
DB01_20220213_2q0lohll_90_1_1.vab

channel ORA_SBT_TAPE_2: piece handle=850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
DB01_20220213_2q0lohll_90_1_1.vab tag=VLSS 5.5

channel ORA_SBT_TAPE_2: restored backup piece 1

channel ORA_SBT_TAPE_2: restore complete, elapsed time: 00:00:15

channel ORA_SBT_TAPE_2: starting datafile backup set restore

channel ORA_SBT_TAPE_2: specifying datafile(s) to restore from backup set

channel ORA_SBT_TAPE_2: restoring datafile 00023 to +DATAC1/DB01/D487A74818F1198DE0530C7219ACE40E/DATAFILE/
tpch_idx.288.1092940191

channel ORA_SBT_TAPE_2: restoring section 2 of 5

channel ORA_SBT_TAPE_2: reading from backup piece 850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
DB01_20220213_2q0lohll_90_2_1.vab

channel ORA_SBT_TAPE_2: piece handle=850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
DB01_20220213_2q0lohll_90_2_1.vab tag=VLSS 5.5

channel ORA_SBT_TAPE_2: restored backup piece 2

channel ORA_SBT_TAPE_2: restore complete, elapsed time: 00:00:15

channel ORA_SBT_TAPE_2: starting datafile backup set restore

channel ORA_SBT_TAPE_2: specifying datafile(s) to restore from backup set

channel ORA_SBT_TAPE_2: restoring datafile 00023 to +DATAC1/DB01/D487A74818F1198DE0530C7219ACE40E/DATAFILE/
tpch_idx.288.1092940191

channel ORA_SBT_TAPE_2: restoring section 3 of 5

channel ORA_SBT_TAPE_2: reading from backup piece 850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
DB01_20220213_2q0lohll_90_3_1.vab

channel ORA_SBT_TAPE_1: piece handle=850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_DB01_20220213_2l-
0lo6tt_85_1_1.vab tag=VLSS 5.3

channel ORA_SBT_TAPE_1: restored backup piece 1

channel ORA_SBT_TAPE_1: restore complete, elapsed time: 00:00:31

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 00023 to +DATAC1/DB01/D487A74818F1198DE0530C7219ACE40E/DATAFILE/
tpch_idx.288.1092940191

channel ORA_SBT_TAPE_1: restoring section 4 of 5

channel ORA_SBT_TAPE_1: reading from backup piece 850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
DB01_20220213_2q0lohll_90_4_1.vab

channel ORA_SBT_TAPE_2: piece handle=850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
DB01_20220213_2q0lohll_90_3_1.vab tag=VLSS 5.5

channel ORA_SBT_TAPE_2: restored backup piece 3

channel ORA_SBT_TAPE_2: restore complete, elapsed time: 00:00:08

channel ORA_SBT_TAPE_2: starting datafile backup set restore

channel ORA_SBT_TAPE_2: specifying datafile(s) to restore from backup set

channel ORA_SBT_TAPE_2: restoring datafile 00023 to +DATAC1/DB01/D487A74818F1198DE0530C7219ACE40E/DATAFILE/
tpch_idx.288.1092940191

channel ORA_SBT_TAPE_2: restoring section 5 of 5

channel ORA_SBT_TAPE_2: reading from backup piece 850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
```

```
DB01_20220213_2q0lohll_90_5_1.vab

channel ORA_SBT_TAPE_1: piece handle=850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
DB01_20220213_2q0lohll_90_4_1.vab tag=VLSS 5.5

channel ORA_SBT_TAPE_1: restored backup piece 4

channel ORA_SBT_TAPE_1: restore complete, elapsed time: 00:00:08

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 +DATAC1/DB01/DATAFILE/system.260.1091971711

channel ORA_SBT_TAPE_1: reading from backup piece 850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
DB01_20220213_300lohs2_96_1_1.vab

channel ORA_SBT_TAPE_1: piece handle=850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
DB01_20220213_300lohs2_96_1_1.vab tag=VLSS 5.6

channel ORA_SBT_TAPE_1: restored backup piece 1

channel ORA_SBT_TAPE_1: restore complete, elapsed time: 00:00:15

channel ORA_SBT_TAPE_2: piece handle=850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
DB01_20220213_2q0lohll_90_5_1.vab tag=VLSS 5.5

channel ORA_SBT_TAPE_2: restored backup piece 5

channel ORA_SBT_TAPE_2: restore complete, elapsed time: 00:00:16

channel ORA_SBT_TAPE_3: piece handle=850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
DB01_20220213_290lo5aj_73_1_1.vab tag=VLSS 5.1

channel ORA_SBT_TAPE_3: restored backup piece 1

channel ORA_SBT_TAPE_3: restore complete, elapsed time: 00:01:39

channel ORA_SBT_TAPE_4: piece handle=850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
DB01_20220213_280lo5aj_72_1_1.vab tag=VLSS 5.1

channel ORA_SBT_TAPE_4: restored backup piece 1

channel ORA_SBT_TAPE_4: restore complete, elapsed time: 00:05:09

Finished restore at 2022/02/14 05:19:52


RMAN> recover database;

Starting recover at 2022/02/14 05:19:53

using channel ORA_SBT_TAPE_1

using channel ORA_SBT_TAPE_2

using channel ORA_SBT_TAPE_3

using channel ORA_SBT_TAPE_4

using channel ORA_DISK_1


starting media recovery

media recovery complete, elapsed time: 00:00:09


Finished recover at 2022/02/14 05:20:02


RMAN>  alter database open;

Statement processed


RMAN>
```

```
Recovery Manager complete.


SQL> show pdbs;


    CON_ID CON_NAME                       OPEN MODE  RESTRICTED
---------- ------------------------------ ---------- ----------
         2 PDB$SEED                       READ ONLY  NO
         5 MINITPCH                       MOUNTED
         6 MAXITPCH                       MOUNTED
SQL> alter pluggable database all open read write;


Pluggable database altered.


SQL> show pdbs;


    CON_ID CON_NAME                       OPEN MODE  RESTRICTED
---------- ------------------------------ ---------- ----------
         2 PDB$SEED                       READ ONLY  NO
         5 MINITPCH                       READ WRITE NO
         6 MAXITPCH                       READ WRITE NO
SQL> alter pluggable database all save state;


Pluggable database altered.
```

Scenario 6.1.2: Complete Recovery of Single PDB to Current Point-in-Time

Recovery Manager: Release 21.0.0.0.0 — Production on Mon Feb 14 14:44:31 2022

Version 21.4.0.0.0

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connected to target database: DB01 (DBID=1723239724)

```
RMAN>
RMAN> run {
2>   RESTORE PLUGGABLE DATABASE MINITPCH;
3>   RECOVER PLUGGABLE DATABASE MINITPCH;
4>   ALTER PLUGGABLE DATABASE MINITPCH OPEN;
5> }
Starting restore at 2022/02/14 14:44:36
using target database control file instead of recovery catalog
allocated channel: ORA_SBT_TAPE_1
channel ORA_SBT_TAPE_1: SID=2458 instance=db011 device type=SBT_TAPE
channel ORA_SBT_TAPE_1: Veeam Plug-in for Oracle RMAN
allocated channel: ORA_SBT_TAPE_2
```

```
channel ORA_SBT_TAPE_2: SID=2542 instance=db011 device type=SBT_TAPE

channel ORA_SBT_TAPE_2: Veeam Plug-in for Oracle RMAN

allocated channel: ORA_SBT_TAPE_3

channel ORA_SBT_TAPE_3: SID=2627 instance=db011 device type=SBT_TAPE

channel ORA_SBT_TAPE_3: Veeam Plug-in for Oracle RMAN

allocated channel: ORA_SBT_TAPE_4

channel ORA_SBT_TAPE_4: SID=2715 instance=db011 device type=SBT_TAPE

channel ORA_SBT_TAPE_4: Veeam Plug-in for Oracle RMAN

allocated channel: ORA_DISK_1

channel ORA_DISK_1: SID=2802 instance=db011 device type=DISK


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 00015 to +DATAC1/DB01/D487A74818F1198DE0530C7219ACE40E/DATAFILE/
system.305.1096615895

channel ORA_SBT_TAPE_1: restoring datafile 00017 to +DATAC1/DB01/D487A74818F1198DE0530C7219ACE40E/DATAFILE/
undotbs1.306.1096615895

channel ORA_SBT_TAPE_1: reading from backup piece 850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
DB01_20220213_2e0lo5e2_78_1_1.vab

channel ORA_SBT_TAPE_2: starting datafile backup set restore

channel ORA_SBT_TAPE_2: specifying datafile(s) to restore from backup set

channel ORA_SBT_TAPE_2: restoring datafile 00016 to +DATAC1/DB01/D487A74818F1198DE0530C7219ACE40E/DATAFILE/
sysaux.307.1096615911

channel ORA_SBT_TAPE_2: restoring datafile 00021 to +DATAC1/DB01/D487A74818F1198DE0530C7219ACE40E/DATAFILE/
undo_2.308.1096615913

channel ORA_SBT_TAPE_2: reading from backup piece 850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
DB01_20220213_2f0lo5er_79_1_1.vab

channel ORA_SBT_TAPE_3: starting datafile backup set restore

channel ORA_SBT_TAPE_3: specifying datafile(s) to restore from backup set

channel ORA_SBT_TAPE_3: restoring datafile 00022 to +DATAC1/DB01/D487A74818F1198DE0530C7219ACE40E/DATAFILE/
tpch_data.310.1096615927

channel ORA_SBT_TAPE_3: reading from backup piece 850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
DB01_20220213_2l0lo6tt_85_1_1.vab

channel ORA_SBT_TAPE_4: starting datafile backup set restore

channel ORA_SBT_TAPE_4: specifying datafile(s) to restore from backup set

channel ORA_SBT_TAPE_4: restoring datafile 00023 to +DATAC1/DB01/D487A74818F1198DE0530C7219ACE40E/DATAFILE/
tpch_idx.309.1096615921

channel ORA_SBT_TAPE_4: restoring section 1 of 5

channel ORA_SBT_TAPE_4: reading from backup piece 850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
DB01_20220213_2q0lohll_90_1_1.vab

channel ORA_SBT_TAPE_1: piece handle=850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
DB01_20220213_2e0lo5e2_78_1_1.vab tag=VLSS 5.1

channel ORA_SBT_TAPE_1: restored backup piece 1

channel ORA_SBT_TAPE_1: restore complete, elapsed time: 00:00:55

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 00023 to +DATAC1/DB01/D487A74818F1198DE0530C7219ACE40E/DATAFILE/
tpch_idx.309.1096615921
```

channel ORA_SBT_TAPE_1: restoring section 2 of 5

channel ORA_SBT_TAPE_1: reading from backup piece 850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_DB01_20220213_2q0lohll_90_2_1.vab

channel ORA_SBT_TAPE_2: piece handle=850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_DB01_20220213_2f0lo5er_79_1_1.vab tag=VLSS 5.1

channel ORA_SBT_TAPE_2: restored backup piece 1

channel ORA_SBT_TAPE_2: restore complete, elapsed time: 00:00:55

channel ORA_SBT_TAPE_2: starting datafile backup set restore

channel ORA_SBT_TAPE_2: specifying datafile(s) to restore from backup set

channel ORA_SBT_TAPE_2: restoring datafile 00023 to +DATAC1/DB01/D487A74818F1198DE0530C7219ACE40E/DATAFILE/tpch_idx.309.1096615921

channel ORA_SBT_TAPE_2: restoring section 3 of 5

channel ORA_SBT_TAPE_2: reading from backup piece 850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_DB01_20220213_2q0lohll_90_3_1.vab

channel ORA_SBT_TAPE_4: piece handle=850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_DB01_20220213_2q0lohll_90_1_1.vab tag=VLSS 5.5

channel ORA_SBT_TAPE_4: restored backup piece 1

channel ORA_SBT_TAPE_4: restore complete, elapsed time: 00:00:55

channel ORA_SBT_TAPE_4: starting datafile backup set restore

channel ORA_SBT_TAPE_4: specifying datafile(s) to restore from backup set

channel ORA_SBT_TAPE_4: restoring datafile 00023 to +DATAC1/DB01/D487A74818F1198DE0530C7219ACE40E/DATAFILE/tpch_idx.309.1096615921

channel ORA_SBT_TAPE_4: restoring section 4 of 5

channel ORA_SBT_TAPE_4: reading from backup piece 850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_DB01_20220213_2q0lohll_90_4_1.vab

channel ORA_SBT_TAPE_3: piece handle=850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_DB01_20220213_2l-0lo6tt_85_1_1.vab tag=VLSS 5.3

channel ORA_SBT_TAPE_3: restored backup piece 1

channel ORA_SBT_TAPE_3: restore complete, elapsed time: 00:00:58

channel ORA_SBT_TAPE_3: starting datafile backup set restore

channel ORA_SBT_TAPE_3: specifying datafile(s) to restore from backup set

channel ORA_SBT_TAPE_3: restoring datafile 00023 to +DATAC1/DB01/D487A74818F1198DE0530C7219ACE40E/DATAFILE/tpch_idx.309.1096615921

channel ORA_SBT_TAPE_3: restoring section 5 of 5

channel ORA_SBT_TAPE_3: reading from backup piece 850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_DB01_20220213_2q0lohll_90_5_1.vab

channel ORA_SBT_TAPE_1: piece handle=850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_DB01_20220213_2q0lohll_90_2_1.vab tag=VLSS 5.5

channel ORA_SBT_TAPE_1: restored backup piece 2

channel ORA_SBT_TAPE_1: restore complete, elapsed time: 00:00:10

channel ORA_SBT_TAPE_2: piece handle=850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_DB01_20220213_2q0lohll_90_3_1.vab tag=VLSS 5.5

channel ORA_SBT_TAPE_2: restored backup piece 3

channel ORA_SBT_TAPE_2: restore complete, elapsed time: 00:00:10

channel ORA_SBT_TAPE_4: piece handle=850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_DB01_20220213_2q0lohll_90_4_1.vab tag=VLSS 5.5

channel ORA_SBT_TAPE_4: restored backup piece 4

channel ORA_SBT_TAPE_4: restore complete, elapsed time: 00:00:10

```
channel ORA_SBT_TAPE_3: piece handle=850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
DB01_20220213_2q0lohll_90_5_1.vab tag=VLSS 5.5

channel ORA_SBT_TAPE_3: restored backup piece 5

channel ORA_SBT_TAPE_3: restore complete, elapsed time: 00:00:15

Finished restore at 2022/02/14 14:46:00


Starting recover at 2022/02/14 14:46:00

using channel ORA_SBT_TAPE_1

using channel ORA_SBT_TAPE_2

using channel ORA_SBT_TAPE_3

using channel ORA_SBT_TAPE_4

using channel ORA_DISK_1


starting media recovery


archived log for thread 1 with sequence 61 is already on disk as file +RECOC1/DB01/ARCHIVELOG/2022_02_14/
thread_1_seq_61.304.1096610643

archived log for thread 2 with sequence 32 is already on disk as file +RECOC1/DB01/ARCHIVELOG/2022_02_14/
thread_2_seq_32.287.1096607313

archived log for thread 2 with sequence 1 is already on disk as file +RECOC1/DB01/ARCHIVELOG/2022_02_14/
thread_2_seq_1.326.1096616377

channel ORA_SBT_TAPE_1: starting archived log restore to default destination

channel ORA_SBT_TAPE_1: restoring archived log

archived log thread=2 sequence=31

channel ORA_SBT_TAPE_1: restoring archived log

archived log thread=1 sequence=60

channel ORA_SBT_TAPE_1: reading from backup piece 850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
DB01_20220213_3a0loiih_106_1_1.vab

channel ORA_SBT_TAPE_1: piece handle=850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
DB01_20220213_3a0loiih_106_1_1.vab tag=VLSS 5.7

channel ORA_SBT_TAPE_1: restored backup piece 1

channel ORA_SBT_TAPE_1: restore complete, elapsed time: 00:00:25

archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_02_14/thread_1_seq_60.325.1096641965 thread=1 sequence=60

archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_02_14/thread_2_seq_31.271.1096641965 thread=2 sequence=31

channel default: deleting archived log(s)

archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_02_14/thread_1_seq_60.325.1096641965 RECID=99
STAMP=1096641973

archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_02_14/thread_1_seq_61.304.1096610643 thread=1 sequence=61

channel default: deleting archived log(s)

archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_02_14/thread_2_seq_31.271.1096641965 RECID=100
STAMP=1096641976

archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_02_14/thread_2_seq_32.287.1096607313 thread=2 sequence=32

media recovery complete, elapsed time: 00:00:05

Finished recover at 2022/02/14 14:46:31


Statement processed
```

```
Recovery Manager complete.


[oracle@pdcxdt01-db01 rman_work]$ sqlplus / as sysdba


SQL*Plus: Release 21.0.0.0.0 — Production on Mon Feb 14 14:47:58 2022

Version 21.4.0.0.0


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Connected to:

Oracle Database 21c Enterprise Edition Release 21.0.0.0.0 — Production

Version 21.4.0.0.0


SQL> show pdbs;


    CON_ID CON_NAME                      OPEN MODE  RESTRICTED

---------- ----------------------------- ---------- ----------

         2 PDB$SEED                      READ ONLY  NO

         5 MINITPCH                      READ WRITE NO

         6 MAXITPCH                      READ WRITE NO
```

Scenario 6.1.3: Complete Recovery of Tablespace Set to Current Point-in-Time

```
SQL> show pdbs;


    CON_ID CON_NAME                      OPEN MODE  RESTRICTED

---------- ----------------------------- ---------- ----------

         2 PDB$SEED                      READ ONLY  NO

         5 MINITPCH                      MOUNTED

         6 MAXITPCH                      READ WRITE NO

SQL> alter pluggable database MINITPCH open read write;

alter pluggable database MINITPCH open read write

*

ERROR at line 1:

ORA-01157: cannot identify/lock data file 23 — see DBWR trace file

ORA-01110: data file 23:

'+DATAC1/DB01/D487A74818F1198DE0530C7219ACE40E/DATAFILE/tpch_idx.309.1096615921'
```

Recovery Manager: Release 21.0.0.0.0 — Production on Mon Feb 14 15:30:31 2022

Version 21.4.0.0.0

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connected to target database: DB01 (DBID=1723239724)

```
RMAN> run {
2>    restore tablespace MINITPCH:TPCH_DATA,MINITPCH:TPCH_IDX;
3>    recover tablespace MINITPCH:TPCH_DATA,MINITPCH:TPCH_IDX;
4>    ALTER PLUGGABLE DATABASE MINITPCH OPEN;
5> }
Starting restore at 2022/02/14 15:30:34
using target database control file instead of recovery catalog
allocated channel: ORA_SBT_TAPE_1
channel ORA_SBT_TAPE_1: SID=953 instance=db011 device type=SBT_TAPE
channel ORA_SBT_TAPE_1: Veeam Plug-in for Oracle RMAN
allocated channel: ORA_SBT_TAPE_2
channel ORA_SBT_TAPE_2: SID=1039 instance=db011 device type=SBT_TAPE
channel ORA_SBT_TAPE_2: Veeam Plug-in for Oracle RMAN
allocated channel: ORA_SBT_TAPE_3
channel ORA_SBT_TAPE_3: SID=1122 instance=db011 device type=SBT_TAPE
channel ORA_SBT_TAPE_3: Veeam Plug-in for Oracle RMAN
allocated channel: ORA_SBT_TAPE_4
channel ORA_SBT_TAPE_4: SID=1210 instance=db011 device type=SBT_TAPE
channel ORA_SBT_TAPE_4: Veeam Plug-in for Oracle RMAN
allocated channel: ORA_DISK_1
channel ORA_DISK_1: SID=1298 instance=db011 device type=DISK


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 00022 to +DATAC1/DB01/D487A74818F1198DE0530C7219ACE40E/DATAFILE/
tpch_data.310.1096615927
channel ORA_SBT_TAPE_1: reading from backup piece 850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
DB01_20220213_2l0lo6tt_85_1_1.vab
channel ORA_SBT_TAPE_2: starting datafile backup set restore
channel ORA_SBT_TAPE_2: specifying datafile(s) to restore from backup set
channel ORA_SBT_TAPE_2: restoring datafile 00023 to +DATAC1/DB01/D487A74818F1198DE0530C7219ACE40E/DATAFILE/
tpch_idx.310.1096644643
channel ORA_SBT_TAPE_2: restoring section 1 of 5
channel ORA_SBT_TAPE_2: reading from backup piece 850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
DB01_20220213_2q0lohll_90_1_1.vab
channel ORA_SBT_TAPE_3: starting datafile backup set restore
channel ORA_SBT_TAPE_3: specifying datafile(s) to restore from backup set
channel ORA_SBT_TAPE_3: restoring datafile 00023 to +DATAC1/DB01/D487A74818F1198DE0530C7219ACE40E/DATAFILE/
tpch_idx.310.1096644643
channel ORA_SBT_TAPE_3: restoring section 2 of 5
channel ORA_SBT_TAPE_3: reading from backup piece 850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
DB01_20220213_2q0lohll_90_2_1.vab
channel ORA_SBT_TAPE_4: starting datafile backup set restore
channel ORA_SBT_TAPE_4: specifying datafile(s) to restore from backup set
channel ORA_SBT_TAPE_4: restoring datafile 00023 to +DATAC1/DB01/D487A74818F1198DE0530C7219ACE40E/DATAFILE/
tpch_idx.310.1096644643
```

channel ORA_SBT_TAPE_4: restoring section 3 of 5

channel ORA_SBT_TAPE_4: reading from backup piece 850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
DB01_20220213_2q0lohll_90_3_1.vab

channel ORA_SBT_TAPE_1: piece handle=850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_DB01_20220213_2l-
0lo6tt_85_1_1.vab tag=VLSS 5.3

channel ORA_SBT_TAPE_1: restored backup piece 1

channel ORA_SBT_TAPE_1: restore complete, elapsed time: 00:00:55

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 00023 to +DATAC1/DB01/D487A74818F1198DE0530C7219ACE40E/DATAFILE/
tpch_idx.310.1096644643

channel ORA_SBT_TAPE_1: restoring section 4 of 5

channel ORA_SBT_TAPE_1: reading from backup piece 850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
DB01_20220213_2q0lohll_90_4_1.vab

channel ORA_SBT_TAPE_2: piece handle=850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
DB01_20220213_2q0lohll_90_1_1.vab tag=VLSS 5.5

channel ORA_SBT_TAPE_2: restored backup piece 1

channel ORA_SBT_TAPE_2: restore complete, elapsed time: 00:00:55

channel ORA_SBT_TAPE_2: starting datafile backup set restore

channel ORA_SBT_TAPE_2: specifying datafile(s) to restore from backup set

channel ORA_SBT_TAPE_2: restoring datafile 00023 to +DATAC1/DB01/D487A74818F1198DE0530C7219ACE40E/DATAFILE/
tpch_idx.310.1096644643

channel ORA_SBT_TAPE_2: restoring section 5 of 5

channel ORA_SBT_TAPE_2: reading from backup piece 850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
DB01_20220213_2q0lohll_90_5_1.vab

channel ORA_SBT_TAPE_3: piece handle=850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
DB01_20220213_2q0lohll_90_2_1.vab tag=VLSS 5.5

channel ORA_SBT_TAPE_3: restored backup piece 2

channel ORA_SBT_TAPE_3: restore complete, elapsed time: 00:00:55

channel ORA_SBT_TAPE_4: piece handle=850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
DB01_20220213_2q0lohll_90_3_1.vab tag=VLSS 5.5

channel ORA_SBT_TAPE_4: restored backup piece 3

channel ORA_SBT_TAPE_4: restore complete, elapsed time: 00:00:55

channel ORA_SBT_TAPE_1: piece handle=850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
DB01_20220213_2q0lohll_90_4_1.vab tag=VLSS 5.5

channel ORA_SBT_TAPE_1: restored backup piece 4

channel ORA_SBT_TAPE_1: restore complete, elapsed time: 00:00:07

channel ORA_SBT_TAPE_2: piece handle=850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
DB01_20220213_2q0lohll_90_5_1.vab tag=VLSS 5.5

channel ORA_SBT_TAPE_2: restored backup piece 5

channel ORA_SBT_TAPE_2: restore complete, elapsed time: 00:00:07

Finished restore at 2022/02/14 15:31:45

Starting recover at 2022/02/14 15:31:45

using channel ORA_SBT_TAPE_1

using channel ORA_SBT_TAPE_2

using channel ORA_SBT_TAPE_3

```
using channel ORA_SBT_TAPE_4

using channel ORA_DISK_1


starting media recovery


archived log for thread 1 with sequence 61 is already on disk as file +RECOC1/DB01/ARCHIVELOG/2022_02_14/
thread_1_seq_61.304.1096610643

archived log for thread 2 with sequence 32 is already on disk as file +RECOC1/DB01/ARCHIVELOG/2022_02_14/
thread_2_seq_32.287.1096607313

archived log for thread 2 with sequence 1 is already on disk as file +RECOC1/DB01/ARCHIVELOG/2022_02_14/
thread_2_seq_1.326.1096616377

channel ORA_SBT_TAPE_1: starting archived log restore to default destination

channel ORA_SBT_TAPE_1: restoring archived log

archived log thread=2 sequence=31

channel ORA_SBT_TAPE_1: restoring archived log

archived log thread=1 sequence=60

channel ORA_SBT_TAPE_1: reading from backup piece 850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
DB01_20220213_3a0loiih_106_1_1.vab

channel ORA_SBT_TAPE_1: piece handle=850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
DB01_20220213_3a0loiih_106_1_1.vab tag=VLSS 5.7

channel ORA_SBT_TAPE_1: restored backup piece 1

channel ORA_SBT_TAPE_1: restore complete, elapsed time: 00:00:25

archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_02_14/thread_1_seq_60.325.1096644709 thread=1 sequence=60

archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_02_14/thread_2_seq_31.274.1096644709 thread=2 sequence=31

channel default: deleting archived log(s)

archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_02_14/thread_1_seq_60.325.1096644709 RECID=101
STAMP=1096644718

archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_02_14/thread_1_seq_61.304.1096610643 thread=1 sequence=61

channel default: deleting archived log(s)

archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_02_14/thread_2_seq_31.274.1096644709 RECID=102
STAMP=1096644721

archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_02_14/thread_2_seq_32.287.1096607313 thread=2 sequence=32

media recovery complete, elapsed time: 00:00:03

Finished recover at 2022/02/14 15:32:14


Statement processed


RMAN> **end-of-file**


RMAN>


SQL> show pdbs;


    CON_ID CON_NAME                      OPEN MODE  RESTRICTED
---------- ----------------------------- ---------- ----------
         2 PDB$SEED                      READ ONLY  NO
         5 MINITPCH                      READ WRITE NO
         6 MAXITPCH                      READ WRITE
```

Scenario 6.1.4: Complete Recovery of Single Tablespace to Current Point-in-Time

```
SQL> alter pluggable database MINITPCH open read write;
alter pluggable database MINITPCH open read write
*
ERROR at line 1:
ORA-01157: cannot identify/lock data file 23 — see DBWR trace file
ORA-01110: data file 23:
'+DATAC1/DB01/D487A74818F1198DE0530C7219ACE40E/DATAFILE/tpch_idx.310.1096644643'



SQL> exit
```

Recovery Manager: Release 21.0.0.0.0 — Production on Mon Feb 14 15:49:17 2022
Version 21.4.0.0.0
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connected to target database: DB01 (DBID=1723239724)

```
RMAN> run {
2>    restore tablespace MINITPCH:TPCH_IDX;
3>    recover tablespace MINITPCH:TPCH_IDX;
4>    ALTER PLUGGABLE DATABASE MINITPCH OPEN;
5> }
Starting restore at 2022/02/14 15:49:22
using target database control file instead of recovery catalog
allocated channel: ORA_SBT_TAPE_1
channel ORA_SBT_TAPE_1: SID=782 instance=db011 device type=SBT_TAPE
channel ORA_SBT_TAPE_1: Veeam Plug-in for Oracle RMAN
allocated channel: ORA_SBT_TAPE_2
channel ORA_SBT_TAPE_2: SID=866 instance=db011 device type=SBT_TAPE
channel ORA_SBT_TAPE_2: Veeam Plug-in for Oracle RMAN
allocated channel: ORA_SBT_TAPE_3
channel ORA_SBT_TAPE_3: SID=953 instance=db011 device type=SBT_TAPE
channel ORA_SBT_TAPE_3: Veeam Plug-in for Oracle RMAN
allocated channel: ORA_SBT_TAPE_4
channel ORA_SBT_TAPE_4: SID=1039 instance=db011 device type=SBT_TAPE
channel ORA_SBT_TAPE_4: Veeam Plug-in for Oracle RMAN
allocated channel: ORA_DISK_1
channel ORA_DISK_1: SID=1122 instance=db011 device type=DISK

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 00023 to +DATAC1/DB01/D487A74818F1198DE0530C7219ACE40E/DATAFILE/
tpch_idx.310.1096645773

channel ORA_SBT_TAPE_1: restoring section 1 of 5

channel ORA_SBT_TAPE_1: reading from backup piece 850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
DB01_20220213_2q0lohll_90_1_1.vab

channel ORA_SBT_TAPE_2: starting datafile backup set restore

channel ORA_SBT_TAPE_2: specifying datafile(s) to restore from backup set

channel ORA_SBT_TAPE_2: restoring datafile 00023 to +DATAC1/DB01/D487A74818F1198DE0530C7219ACE40E/DATAFILE/
tpch_idx.310.1096645773

channel ORA_SBT_TAPE_2: restoring section 2 of 5

channel ORA_SBT_TAPE_2: reading from backup piece 850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
DB01_20220213_2q0lohll_90_2_1.vab

channel ORA_SBT_TAPE_3: starting datafile backup set restore

channel ORA_SBT_TAPE_3: specifying datafile(s) to restore from backup set

channel ORA_SBT_TAPE_3: restoring datafile 00023 to +DATAC1/DB01/D487A74818F1198DE0530C7219ACE40E/DATAFILE/
tpch_idx.310.1096645773

channel ORA_SBT_TAPE_3: restoring section 3 of 5

channel ORA_SBT_TAPE_3: reading from backup piece 850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
DB01_20220213_2q0lohll_90_3_1.vab

channel ORA_SBT_TAPE_4: starting datafile backup set restore

channel ORA_SBT_TAPE_4: specifying datafile(s) to restore from backup set

channel ORA_SBT_TAPE_4: restoring datafile 00023 to +DATAC1/DB01/D487A74818F1198DE0530C7219ACE40E/DATAFILE/
tpch_idx.310.1096645773

channel ORA_SBT_TAPE_4: restoring section 4 of 5

channel ORA_SBT_TAPE_4: reading from backup piece 850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
DB01_20220213_2q0lohll_90_4_1.vab

channel ORA_SBT_TAPE_2: piece handle=850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
DB01_20220213_2q0lohll_90_2_1.vab tag=VLSS 5.5

channel ORA_SBT_TAPE_2: restored backup piece 2

channel ORA_SBT_TAPE_2: restore complete, elapsed time: 00:00:45

channel ORA_SBT_TAPE_2: starting datafile backup set restore

channel ORA_SBT_TAPE_2: specifying datafile(s) to restore from backup set

channel ORA_SBT_TAPE_2: restoring datafile 00023 to +DATAC1/DB01/D487A74818F1198DE0530C7219ACE40E/DATAFILE/
tpch_idx.310.1096645773

channel ORA_SBT_TAPE_2: restoring section 5 of 5

channel ORA_SBT_TAPE_2: reading from backup piece 850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
DB01_20220213_2q0lohll_90_5_1.vab

channel ORA_SBT_TAPE_3: piece handle=850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
DB01_20220213_2q0lohll_90_3_1.vab tag=VLSS 5.5

channel ORA_SBT_TAPE_3: restored backup piece 3

channel ORA_SBT_TAPE_3: restore complete, elapsed time: 00:00:45

channel ORA_SBT_TAPE_4: piece handle=850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
DB01_20220213_2q0lohll_90_4_1.vab tag=VLSS 5.5

channel ORA_SBT_TAPE_4: restored backup piece 4

channel ORA_SBT_TAPE_4: restore complete, elapsed time: 00:00:45

channel ORA_SBT_TAPE_1: piece handle=850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
DB01_20220213_2q0lohll_90_1_1.vab tag=VLSS 5.5

channel ORA_SBT_TAPE_1: restored backup piece 1
```

channel ORA_SBT_TAPE_1: restore complete, elapsed time: 00:00:46

channel ORA_SBT_TAPE_2: piece handle=850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
DB01_20220213_2q0lohll_90_5_1.vab tag=VLSS 5.5

channel ORA_SBT_TAPE_2: restored backup piece 5

channel ORA_SBT_TAPE_2: restore complete, elapsed time: 00:00:07

Finished restore at 2022/02/14 15:50:24

Starting recover at 2022/02/14 15:50:24

using channel ORA_SBT_TAPE_1

using channel ORA_SBT_TAPE_2

using channel ORA_SBT_TAPE_3

using channel ORA_SBT_TAPE_4

using channel ORA_DISK_1

starting media recovery

archived log for thread 1 with sequence 61 is already on disk as file +RECOC1/DB01/ARCHIVELOG/2022_02_14/
thread_1_seq_61.304.1096610643

archived log for thread 2 with sequence 32 is already on disk as file +RECOC1/DB01/ARCHIVELOG/2022_02_14/
thread_2_seq_32.287.1096607313

archived log for thread 2 with sequence 1 is already on disk as file +RECOC1/DB01/ARCHIVELOG/2022_02_14/
thread_2_seq_1.326.1096616377

channel ORA_SBT_TAPE_1: starting archived log restore to default destination

channel ORA_SBT_TAPE_1: restoring archived log

archived log thread=2 sequence=31

channel ORA_SBT_TAPE_1: restoring archived log

archived log thread=1 sequence=60

channel ORA_SBT_TAPE_1: reading from backup piece 850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
DB01_20220213_3a0loiih_106_1_1.vab

channel ORA_SBT_TAPE_1: piece handle=850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
DB01_20220213_3a0loiih_106_1_1.vab tag=VLSS 5.7

channel ORA_SBT_TAPE_1: restored backup piece 1

channel ORA_SBT_TAPE_1: restore complete, elapsed time: 00:00:25

archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_02_14/thread_1_seq_60.325.1096645829 thread=1 sequence=60

archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_02_14/thread_2_seq_31.274.1096645827 thread=2 sequence=31

channel default: deleting archived log(s)

archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_02_14/thread_1_seq_60.325.1096645829 RECID=103
STAMP=1096645837

archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_02_14/thread_1_seq_61.304.1096610643 thread=1 sequence=61

channel default: deleting archived log(s)

archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_02_14/thread_2_seq_31.274.1096645827 RECID=104
STAMP=1096645839

archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_02_14/thread_2_seq_32.287.1096607313 thread=2 sequence=32

media recovery complete, elapsed time: 00:00:04

Finished recover at 2022/02/14 15:50:54

```
Statement processed


Recovery Manager complete.
SQL> show pdbs;


    CON_ID CON_NAME                       OPEN MODE  RESTRICTED
---------- ------------------------------ ---------- ----------
         2 PDB$SEED                       READ ONLY  NO
         5 MINITPCH                       READ WRITE NO
         6 MAXITPCH                       READ WRITE NO
```

Scenario 6.1.5: Complete Recovery of Single Datafile to Current Point-in-Time

```
SQL> alter pluggable database minitpch open read write;
alter pluggable database minitpch open read write
*
ERROR at line 1:
ORA-01157: cannot identify/lock data file 15 — see DBWR trace file
ORA-01110: data file 15:
'+DATAC1/DB01/D487A74818F1198DE0530C7219ACE40E/DATAFILE/system.305.1096615895'


SQL> exit
```

Recovery Manager: Release 21.0.0.0.0 — Production on Mon Feb 14 16:20:32 2022
Version 21.4.0.0.0
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connected to target database: DB01 (DBID=1723239724)

```
RMAN> run {
2>   restore datafile 15;
3>   recover datafile 15;
4>   ALTER PLUGGABLE DATABASE MINITPCH OPEN;
5> }
Starting restore at 2022/02/14 16:20:38
using target database control file instead of recovery catalog
allocated channel: ORA_SBT_TAPE_1
channel ORA_SBT_TAPE_1: SID=780 instance=db011 device type=SBT_TAPE
channel ORA_SBT_TAPE_1: Veeam Plug-in for Oracle RMAN
allocated channel: ORA_SBT_TAPE_2
channel ORA_SBT_TAPE_2: SID=866 instance=db011 device type=SBT_TAPE
channel ORA_SBT_TAPE_2: Veeam Plug-in for Oracle RMAN
allocated channel: ORA_SBT_TAPE_3
channel ORA_SBT_TAPE_3: SID=953 instance=db011 device type=SBT_TAPE
```

```
channel ORA_SBT_TAPE_3: Veeam Plug-in for Oracle RMAN

allocated channel: ORA_SBT_TAPE_4

channel ORA_SBT_TAPE_4: SID=1039 instance=db011 device type=SBT_TAPE

channel ORA_SBT_TAPE_4: Veeam Plug-in for Oracle RMAN

allocated channel: ORA_DISK_1

channel ORA_DISK_1: SID=1122 instance=db011 device type=DISK


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 00015 to +DATAC1/DB01/D487A74818F1198DE0530C7219ACE40E/DATAFILE/
system.305.1096615895

channel ORA_SBT_TAPE_1: reading from backup piece 850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
DB01_20220213_2e0lo5e2_78_1_1.vab

channel ORA_SBT_TAPE_1: piece handle=850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
DB01_20220213_2e0lo5e2_78_1_1.vab tag=VLSS 5.1

channel ORA_SBT_TAPE_1: restored backup piece 1

channel ORA_SBT_TAPE_1: restore complete, elapsed time: 00:00:45

Finished restore at 2022/02/14 16:21:33


Starting recover at 2022/02/14 16:21:33

using channel ORA_SBT_TAPE_1

using channel ORA_SBT_TAPE_2

using channel ORA_SBT_TAPE_3

using channel ORA_SBT_TAPE_4

using channel ORA_DISK_1


starting media recovery


archived log for thread 1 with sequence 61 is already on disk as file +RECOC1/DB01/ARCHIVELOG/2022_02_14/
thread_1_seq_61.304.1096610643

archived log for thread 2 with sequence 32 is already on disk as file +RECOC1/DB01/ARCHIVELOG/2022_02_14/
thread_2_seq_32.287.1096607313

archived log for thread 2 with sequence 1 is already on disk as file +RECOC1/DB01/ARCHIVELOG/2022_02_14/
thread_2_seq_1.326.1096616377

channel ORA_SBT_TAPE_1: starting archived log restore to default destination

channel ORA_SBT_TAPE_1: restoring archived log

archived log thread=2 sequence=31

channel ORA_SBT_TAPE_1: restoring archived log

archived log thread=1 sequence=60

channel ORA_SBT_TAPE_1: reading from backup piece 850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
DB01_20220213_3a0loiih_106_1_1.vab

channel ORA_SBT_TAPE_1: piece handle=850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
DB01_20220213_3a0loiih_106_1_1.vab tag=VLSS 5.7

channel ORA_SBT_TAPE_1: restored backup piece 1

channel ORA_SBT_TAPE_1: restore complete, elapsed time: 00:00:25

archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_02_14/thread_1_seq_60.325.1096647697 thread=1 sequence=60
```

```
archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_02_14/thread_2_seq_31.274.1096647697 thread=2 sequence=31

channel default: deleting archived log(s)

archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_02_14/thread_1_seq_60.325.1096647697 RECID=105
STAMP=1096647705

archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_02_14/thread_1_seq_61.304.1096610643 thread=1 sequence=61

channel default: deleting archived log(s)

archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_02_14/thread_2_seq_31.274.1096647697 RECID=106
STAMP=1096647708

archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_02_14/thread_2_seq_32.287.1096607313 thread=2 sequence=32

media recovery complete, elapsed time: 00:00:05

Finished recover at 2022/02/14 16:22:04


Statement processed


RMAN> **end-of-file**


RMAN>


Recovery Manager complete.

SQL> show pdbs;


    CON_ID CON_NAME                       OPEN MODE  RESTRICTED
---------- ------------------------------ ---------- ----------
         2 PDB$SEED                       READ ONLY  NO
         5 MINITPCH                       READ WRITE NO
         6 MAXITPCH                       READ WRITE NO
```

Scenario 6.2.1: Incomplete Recovery of Complete Database to Prior Point-in-Time

Recovery Manager: Release 21.0.0.0.0 — Production on Tue Feb 15 03:24:16 2022

Version 21.4.0.0.0

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connected to target database: DB01 (DBID=1723239724, not open)

```
RMAN>

RMAN> run {

2>    SET UNTIL TIME "to_date('15-FEB-2022 00:00:00','DD-MON-YYYY HH24:MI:SS')";

3>    restore database;

4>    recover database;

5>    alter database open resetlogs;

6> }

executing command: SET until clause
```

```
Starting restore at 2022/02/15 03:24:19

using target database control file instead of recovery catalog

allocated channel: ORA_SBT_TAPE_1

channel ORA_SBT_TAPE_1: SID=350 instance=db011 device type=SBT_TAPE

channel ORA_SBT_TAPE_1: Veeam Plug-in for Oracle RMAN

allocated channel: ORA_SBT_TAPE_2

channel ORA_SBT_TAPE_2: SID=435 instance=db011 device type=SBT_TAPE

channel ORA_SBT_TAPE_2: Veeam Plug-in for Oracle RMAN

allocated channel: ORA_SBT_TAPE_3

channel ORA_SBT_TAPE_3: SID=519 instance=db011 device type=SBT_TAPE

channel ORA_SBT_TAPE_3: Veeam Plug-in for Oracle RMAN

allocated channel: ORA_SBT_TAPE_4

channel ORA_SBT_TAPE_4: SID=607 instance=db011 device type=SBT_TAPE

channel ORA_SBT_TAPE_4: Veeam Plug-in for Oracle RMAN

allocated channel: ORA_DISK_1

channel ORA_DISK_1: SID=692 instance=db011 device type=DISK


skipping datafile 2; already restored to file +DATAC1/DB01/D3BC41554351C1D3E0530B7219ACCE32/DATAFILE/sys-
tem.261.1091971711

skipping datafile 4; already restored to file +DATAC1/DB01/D3BC41554351C1D3E0530B7219ACCE32/DATAFILE/sys-
aux.263.1091971715

skipping datafile 6; already restored to file +DATAC1/DB01/D3BC41554351C1D3E0530B7219ACCE32/DATAFILE/un-
dotbs1.265.1091971717

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 +DATAC1/DB01/DATAFILE/system.311.1096615961

channel ORA_SBT_TAPE_1: restoring datafile 00008 to +DATAC1/DB01/DATAFILE/users.269.1091971731

channel ORA_SBT_TAPE_1: reading from backup piece 850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
DB01_20220214_050lraa9_5_1_1.vab

channel ORA_SBT_TAPE_2: starting datafile backup set restore

channel ORA_SBT_TAPE_2: specifying datafile(s) to restore from backup set

channel ORA_SBT_TAPE_2: restoring datafile 00003 to +DATAC1/DB01/DATAFILE/sysaux.262.1091971713

channel ORA_SBT_TAPE_2: restoring datafile 00007 to +DATAC1/DB01/DATAFILE/undotbs2.268.1091971729

channel ORA_SBT_TAPE_2: reading from backup piece 850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
DB01_20220214_040lraa9_4_1_1.vab

channel ORA_SBT_TAPE_3: starting datafile backup set restore

channel ORA_SBT_TAPE_3: specifying datafile(s) to restore from backup set

channel ORA_SBT_TAPE_3: restoring datafile 00005 to +DATAC1/DB01/DATAFILE/undotbs1.264.1091971715

channel ORA_SBT_TAPE_3: reading from backup piece 850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
DB01_20220214_060lrack_6_1_1.vab

channel ORA_SBT_TAPE_4: starting datafile backup set restore

channel ORA_SBT_TAPE_4: specifying datafile(s) to restore from backup set

channel ORA_SBT_TAPE_4: restoring datafile 00015 to +DATAC1/DB01/D487A74818F1198DE0530C7219ACE40E/DATAFILE/
system.305.1096647689

channel ORA_SBT_TAPE_4: restoring datafile 00017 to +DATAC1/DB01/D487A74818F1198DE0530C7219ACE40E/DATAFILE/
undotbs1.306.1096615895
```

```
channel ORA_SBT_TAPE_4: reading from backup piece 850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
DB01_20220214_080lrad2_8_1_1.vab

channel ORA_SBT_TAPE_1: piece handle=850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
DB01_20220214_050lraa9_5_1_1.vab tag=VLSS 5.1

channel ORA_SBT_TAPE_1: restored backup piece 1

channel ORA_SBT_TAPE_1: restore complete, elapsed time: 00:00:55

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 00022 to +DATAC1/DB01/D487A74818F1198DE0530C7219ACE40E/DATAFILE/
tpch_data.309.1096644687

channel ORA_SBT_TAPE_1: restoring datafile 00023 to +DATAC1/DB01/D487A74818F1198DE0530C7219ACE40E/DATAFILE/
tpch_idx.310.1096645773

channel ORA_SBT_TAPE_1: reading from backup piece 850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
DB01_20220214_070lracr_7_1_1.vab

channel ORA_SBT_TAPE_2: piece handle=850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
DB01_20220214_040lraa9_4_1_1.vab tag=VLSS 5.1

channel ORA_SBT_TAPE_2: restored backup piece 1

channel ORA_SBT_TAPE_2: restore complete, elapsed time: 00:00:55

channel ORA_SBT_TAPE_2: starting datafile backup set restore

channel ORA_SBT_TAPE_2: specifying datafile(s) to restore from backup set

channel ORA_SBT_TAPE_2: restoring datafile 00016 to +DATAC1/DB01/D487A74818F1198DE0530C7219ACE40E/DATAFILE/
sysaux.307.1096615911

channel ORA_SBT_TAPE_2: restoring datafile 00021 to +DATAC1/DB01/D487A74818F1198DE0530C7219ACE40E/DATAFILE/
undo_2.308.1096615913

channel ORA_SBT_TAPE_2: reading from backup piece 850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
DB01_20220214_090lradr_9_1_1.vab

channel ORA_SBT_TAPE_3: piece handle=850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
DB01_20220214_060lrack_6_1_1.vab tag=VLSS 5.1

channel ORA_SBT_TAPE_3: restored backup piece 1

channel ORA_SBT_TAPE_3: restore complete, elapsed time: 00:00:55

channel ORA_SBT_TAPE_3: starting datafile backup set restore

channel ORA_SBT_TAPE_3: specifying datafile(s) to restore from backup set

channel ORA_SBT_TAPE_3: restoring datafile 00018 to +DATAC1/DB01/D487A74818F3198DE0530C7219ACE40E/DATAFILE/
system.282.1092845715

channel ORA_SBT_TAPE_3: restoring datafile 00019 to +DATAC1/DB01/D487A74818F3198DE0530C7219ACE40E/DATAFILE/
sysaux.283.1092845715

channel ORA_SBT_TAPE_3: reading from backup piece 850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
DB01_20220214_0a0lraeb_10_1_1.vab

channel ORA_SBT_TAPE_4: piece handle=850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
DB01_20220214_080lrad2_8_1_1.vab tag=VLSS 5.1

channel ORA_SBT_TAPE_4: restored backup piece 1

channel ORA_SBT_TAPE_4: restore complete, elapsed time: 00:00:55

channel ORA_SBT_TAPE_4: starting datafile backup set restore

channel ORA_SBT_TAPE_4: specifying datafile(s) to restore from backup set

channel ORA_SBT_TAPE_4: restoring datafile 00020 to +DATAC1/DB01/D487A74818F3198DE0530C7219ACE40E/DATAFILE/
undotbs1.284.1092845715

channel ORA_SBT_TAPE_4: restoring datafile 00026 to +DATAC1/DB01/D487A74818F3198DE0530C7219ACE40E/DATAFILE/
tpch_idx.291.1092942487

channel ORA_SBT_TAPE_4: reading from backup piece 850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
```

```
DB01_20220214_030lraa9_3_1_1.vab
channel ORA_SBT_TAPE_2: piece handle=850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
DB01_20220214_090lradr_9_1_1.vab tag=VLSS 5.1
channel ORA_SBT_TAPE_2: restored backup piece 1
channel ORA_SBT_TAPE_2: restore complete, elapsed time: 00:00:15
channel ORA_SBT_TAPE_2: starting datafile backup set restore
channel ORA_SBT_TAPE_2: specifying datafile(s) to restore from backup set
channel ORA_SBT_TAPE_2: restoring datafile 00024 to +DATAC1/DB01/D487A74818F3198DE0530C7219ACE40E/DATAFILE/
undo_2.289.1092942359
channel ORA_SBT_TAPE_2: restoring datafile 00025 to +DATAC1/DB01/D487A74818F3198DE0530C7219ACE40E/DATAFILE/
tpch_data.290.1092942481
channel ORA_SBT_TAPE_2: reading from backup piece 850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
DB01_20220214_020lraa9_2_1_1.vab
channel ORA_SBT_TAPE_3: piece handle=850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
DB01_20220214_0a0lraeb_10_1_1.vab tag=VLSS 5.1
channel ORA_SBT_TAPE_3: restored backup piece 1
channel ORA_SBT_TAPE_3: restore complete, elapsed time: 00:00:15
channel ORA_SBT_TAPE_1: piece handle=850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
DB01_20220214_070lracr_7_1_1.vab tag=VLSS 5.1
channel ORA_SBT_TAPE_1: restored backup piece 1
channel ORA_SBT_TAPE_1: restore complete, elapsed time: 00:00:30
channel ORA_SBT_TAPE_4: piece handle=850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
DB01_20220214_030lraa9_3_1_1.vab tag=VLSS 5.1
channel ORA_SBT_TAPE_4: restored backup piece 1
channel ORA_SBT_TAPE_4: restore complete, elapsed time: 00:01:20
channel ORA_SBT_TAPE_2: piece handle=850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
DB01_20220214_020lraa9_2_1_1.vab tag=VLSS 5.1
channel ORA_SBT_TAPE_2: restored backup piece 1
channel ORA_SBT_TAPE_2: restore complete, elapsed time: 00:04:35
Finished restore at 2022/02/15 03:30:16


Starting recover at 2022/02/15 03:30:16
using channel ORA_SBT_TAPE_1
using channel ORA_SBT_TAPE_2
using channel ORA_SBT_TAPE_3
using channel ORA_SBT_TAPE_4
using channel ORA_DISK_1


starting media recovery
media recovery complete, elapsed time: 00:00:07


Finished recover at 2022/02/15 03:30:24


Statement processed
```

```
List of Database Incarnations

DB Key  Inc Key DB Name  DB ID            STATUS  Reset SCN  Reset Time
------- ------- -------- ---------------- --- ---------- ----------
1       1       DB01     1723239724       ORPHAN  1          2021/12/22 13:28:12
2       2       DB01     1723239724       PARENT  114674248  2022/02/14 18:09:05
3       3       DB01     1723239724       PARENT  114680570  2022/02/14 18:55:01
4       4       DB01     1723239724       CURRENT 114784043  2022/02/15 03:30:24



Recovery Manager complete.
```

Scenario 6.2.2: Incomplete Recovery of Individual PDB to Prior Point-in-Time

Recovery Manager: Release 21.0.0.0.0 — Production on Tue Feb 15 04:23:38 2022

Version 21.4.0.0.0

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connected to target database: DB01 (DBID=1723239724)

```
RMAN>
RMAN> run {
2>   SET UNTIL TIME "to_date('15-FEB-2022 04:00:00','DD-MON-YYYY HH24:MI:SS')";
3>   RESTORE PLUGGABLE DATABASE MINITPCH;
4>   RECOVER PLUGGABLE DATABASE MINITPCH;
5>   ALTER PLUGGABLE DATABASE MINITPCH OPEN;
6>
7> }
executing command: SET until clause

Starting restore at 2022/02/15 04:23:42
using target database control file instead of recovery catalog
allocated channel: ORA_SBT_TAPE_1
channel ORA_SBT_TAPE_1: SID=92 instance=db011 device type=SBT_TAPE
channel ORA_SBT_TAPE_1: Veeam Plug-in for Oracle RMAN
allocated channel: ORA_SBT_TAPE_2
channel ORA_SBT_TAPE_2: SID=349 instance=db011 device type=SBT_TAPE
channel ORA_SBT_TAPE_2: Veeam Plug-in for Oracle RMAN
allocated channel: ORA_SBT_TAPE_3
channel ORA_SBT_TAPE_3: SID=952 instance=db011 device type=SBT_TAPE
channel ORA_SBT_TAPE_3: Veeam Plug-in for Oracle RMAN
allocated channel: ORA_SBT_TAPE_4
channel ORA_SBT_TAPE_4: SID=1037 instance=db011 device type=SBT_TAPE
channel ORA_SBT_TAPE_4: Veeam Plug-in for Oracle RMAN
allocated channel: ORA_DISK_1
```

```
channel ORA_DISK_1: SID=1125 instance=db011 device type=DISK


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 00015 to +DATAC1/DB01/D487A74818F1198DE0530C7219ACE40E/DATAFILE/
system.305.1096647689

channel ORA_SBT_TAPE_1: restoring datafile 00017 to +DATAC1/DB01/D487A74818F1198DE0530C7219ACE40E/DATAFILE/
undotbs1.306.1096615895

channel ORA_SBT_TAPE_1: reading from backup piece 850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
DB01_20220215_0q0ls95n_26_1_1.vab

channel ORA_SBT_TAPE_2: starting datafile backup set restore

channel ORA_SBT_TAPE_2: specifying datafile(s) to restore from backup set

channel ORA_SBT_TAPE_2: restoring datafile 00016 to +DATAC1/DB01/D487A74818F1198DE0530C7219ACE40E/DATAFILE/
sysaux.307.1096615911

channel ORA_SBT_TAPE_2: restoring datafile 00021 to +DATAC1/DB01/D487A74818F1198DE0530C7219ACE40E/DATAFILE/
undo_2.308.1096615913

channel ORA_SBT_TAPE_2: reading from backup piece 850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
DB01_20220215_0r0ls966_27_1_1.vab

channel ORA_SBT_TAPE_3: starting datafile backup set restore

channel ORA_SBT_TAPE_3: specifying datafile(s) to restore from backup set

channel ORA_SBT_TAPE_3: restoring datafile 00022 to +DATAC1/DB01/D487A74818F1198DE0530C7219ACE40E/DATAFILE/
tpch_data.309.1096644687

channel ORA_SBT_TAPE_3: restoring datafile 00023 to +DATAC1/DB01/D487A74818F1198DE0530C7219ACE40E/DATAFILE/
tpch_idx.310.1096645773

channel ORA_SBT_TAPE_3: reading from backup piece 850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
DB01_20220215_0p0ls95g_25_1_1.vab

channel ORA_SBT_TAPE_1: piece handle=850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
DB01_20220215_0q0ls95n_26_1_1.vab tag=VLSS 5.1

channel ORA_SBT_TAPE_1: restored backup piece 1

channel ORA_SBT_TAPE_1: restore complete, elapsed time: 00:00:15

channel ORA_SBT_TAPE_2: piece handle=850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
DB01_20220215_0r0ls966_27_1_1.vab tag=VLSS 5.1

channel ORA_SBT_TAPE_2: restored backup piece 1

channel ORA_SBT_TAPE_2: restore complete, elapsed time: 00:00:15

channel ORA_SBT_TAPE_3: piece handle=850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
DB01_20220215_0p0ls95g_25_1_1.vab tag=VLSS 5.1

channel ORA_SBT_TAPE_3: restored backup piece 1

channel ORA_SBT_TAPE_3: restore complete, elapsed time: 00:00:25

Finished restore at 2022/02/15 04:24:18


Starting recover at 2022/02/15 04:24:19

using channel ORA_SBT_TAPE_1

using channel ORA_SBT_TAPE_2

using channel ORA_SBT_TAPE_3

using channel ORA_SBT_TAPE_4

using channel ORA_DISK_1


starting media recovery
```

```
media recovery complete, elapsed time: 00:00:00


Finished recover at 2022/02/15 04:24:20


RMAN-00571: ===========================================================
RMAN-00569: =============== ERROR MESSAGE STACK FOLLOWS ===============
RMAN-00571: ===========================================================
RMAN-03002: failure of sql statement command at 02/15/2022 04:24:21
ORA-01113: file 15 needs media recovery
ORA-01110: data file 15: '+DATAC1/DB01/D487A74818F1198DE0530C7219ACE40E/DATAFILE/system.305.1096647689'


RMAN> **end-of-file**


RMAN>
Starting recover at 2022/02/15 04:26:40
using channel ORA_SBT_TAPE_1
using channel ORA_SBT_TAPE_2
using channel ORA_SBT_TAPE_3
using channel ORA_SBT_TAPE_4
using channel ORA_DISK_1


starting media recovery
media recovery complete, elapsed time: 00:00:01


Finished recover at 2022/02/15 04:26:41


Recovery Manager complete.
```

Scenario 6.2.3: Incomplete Recovery of Single Tablespace to Prior Point In Time

Recovery Manager: Release 21.0.0.0.0 - Production on Mon Feb 14 14:44:31 2022

```
RMAN> run{
recover tablespace maxitpch:users until time "to_date('27-apr-22 22:50:41','dd-mon-rr hh24:mi:ss')"
auxiliary destination '+DATAC1';
}
2> 3> 4>
Starting recover at 27-APR-22
current log archived
using channel ORA_SBT_TAPE_1
using channel ORA_SBT_TAPE_2
using channel ORA_SBT_TAPE_3
```

```
using channel ORA_SBT_TAPE_4

using channel ORA_DISK_1


Creating automatic instance, with SID='Cylb'


initialization parameters used for automatic instance:

db_name=DB01

db_unique_name=Cylb_pitr_maxitpch_DB01

compatible=21.0.0

db_block_size=8192

db_files=1024

diagnostic_dest=/u01/app/oracle

_pdb_name_case_sensitive=false

_system_trig_enabled=FALSE

sga_target=24544M

processes=200

db_create_file_dest=+DATAC1

log_archive_dest_1='location=+DATAC1'

enable_pluggable_database=true

_clone_one_pdb_recovery=true

#No auxiliary parameter file used


starting up automatic instance DB01


Oracle instance started


Total System Global Area   25731269328 bytes


Fixed Size                    28574416 bytes

Variable Size               2885681152 bytes

Database Buffers           22682796032 bytes

Redo Buffers                 134217728 bytes

Automatic instance created


contents of Memory Script:

{

# set requested point in time

set until  time "to_date('27-apr-22 22:50:41','dd-mon-rr hh24:mi:ss')";

# restore the controlfile

restore clone controlfile;


# mount the controlfile

sql clone 'alter database mount clone database';
```

```
# archive current online log
sql 'alter system archive log current';
# avoid unnecessary autobackups for structural changes during TSPITR
sql 'begin dbms_backup_restore.AutoBackupFlag(FALSE); end;';
# resync catalog
resync catalog;
}
executing Memory Script

executing command: SET until clause

Starting restore at 27-APR-22
allocated channel: ORA_AUX_SBT_TAPE_1
channel ORA_AUX_SBT_TAPE_1: SID=198 device type=SBT_TAPE
channel ORA_AUX_SBT_TAPE_1: Veeam Plug-in for Oracle RMAN
allocated channel: ORA_AUX_SBT_TAPE_2
channel ORA_AUX_SBT_TAPE_2: SID=208 device type=SBT_TAPE
channel ORA_AUX_SBT_TAPE_2: Veeam Plug-in for Oracle RMAN
allocated channel: ORA_AUX_SBT_TAPE_3
channel ORA_AUX_SBT_TAPE_3: SID=218 device type=SBT_TAPE
channel ORA_AUX_SBT_TAPE_3: Veeam Plug-in for Oracle RMAN
allocated channel: ORA_AUX_SBT_TAPE_4
channel ORA_AUX_SBT_TAPE_4: SID=228 device type=SBT_TAPE
channel ORA_AUX_SBT_TAPE_4: Veeam Plug-in for Oracle RMAN
allocated channel: ORA_AUX_DISK_1
channel ORA_AUX_DISK_1: SID=238 device type=DISK

channel ORA_AUX_SBT_TAPE_1: starting datafile backup set restore
channel ORA_AUX_SBT_TAPE_1: restoring control file
channel ORA_AUX_SBT_TAPE_1: reading from backup piece c-1723239724-20220427-01_RMAN_AUTOBACKUP.vab
channel ORA_AUX_SBT_TAPE_1: piece handle=c-1723239724-20220427-01_RMAN_AUTOBACKUP.vab tag=TAG20220427T224842
channel ORA_AUX_SBT_TAPE_1: restored backup piece 1
channel ORA_AUX_SBT_TAPE_1: restore complete, elapsed time: 00:00:45
output file name=+DATAC1/DB01/CONTROLFILE/current.305.1103151327
Finished restore at 27-APR-22

sql statement: alter database mount clone database

sql statement: alter system archive log current

sql statement: begin dbms_backup_restore.AutoBackupFlag(FALSE); end;
```

```
starting full resync of recovery catalog
full resync complete


contents of Memory Script:
{
# set requested point in time
set until  time "to_date('27-apr-22 22:50:41','dd-mon-rr hh24:mi:ss')";
# set destinations for recovery set and auxiliary set datafiles
set newname for clone datafile  18 to new;
set newname for clone datafile  1 to new;
set newname for clone datafile  20 to new;
set newname for clone datafile  5 to new;
set newname for clone datafile  7 to new;
set newname for clone datafile  24 to new;
set newname for clone datafile  3 to new;
set newname for clone datafile  19 to new;
set newname for clone tempfile  1 to new;
set newname for clone tempfile  4 to new;
set newname for datafile  27 to new;
# switch all tempfiles
switch clone tempfile all;
# restore the tablespaces in the recovery set and the auxiliary set
restore clone datafile  18, 1, 20, 5, 7, 24, 3, 19, 27;


switch clone datafile all;
}
executing Memory Script
executing command: SET until clause
executing command: SET NEWNAME
executing command: SET NEWNAME
executing command: SET NEWNAME
executing command: SET NEWNAME
executing command: SET NEWNAME
executing command: SET NEWNAME
executing command: SET NEWNAME
executing command: SET NEWNAME
executing command: SET NEWNAME
executing command: SET NEWNAME
executing command: SET NEWNAME


renamed tempfile 1 to +DATAC1 in control file
renamed tempfile 4 to +DATAC1 in control file
```

```
Starting restore at 27-APR-22
using channel ORA_AUX_SBT_TAPE_1
using channel ORA_AUX_SBT_TAPE_2
using channel ORA_AUX_SBT_TAPE_3
using channel ORA_AUX_SBT_TAPE_4
using channel ORA_AUX_DISK_1


channel ORA_AUX_SBT_TAPE_1: starting datafile backup set restore
channel ORA_AUX_SBT_TAPE_1: specifying datafile(s) to restore from backup set
channel ORA_AUX_SBT_TAPE_1: restoring datafile 00001 to +DATAC1
channel ORA_AUX_SBT_TAPE_1: reading from backup piece 850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
DB01_20220427_490s1ehc_137_1_1.vab
channel ORA_AUX_SBT_TAPE_2: starting datafile backup set restore
channel ORA_AUX_SBT_TAPE_2: specifying datafile(s) to restore from backup set
channel ORA_AUX_SBT_TAPE_2: restoring datafile 00007 to +DATAC1
channel ORA_AUX_SBT_TAPE_2: restoring datafile 00003 to +DATAC1
channel ORA_AUX_SBT_TAPE_2: reading from backup piece 850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
DB01_20220427_480s1ehc_136_1_1.vab
channel ORA_AUX_SBT_TAPE_3: starting datafile backup set restore
channel ORA_AUX_SBT_TAPE_3: specifying datafile(s) to restore from backup set
channel ORA_AUX_SBT_TAPE_3: restoring datafile 00005 to +DATAC1
channel ORA_AUX_SBT_TAPE_3: reading from backup piece 850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
DB01_20220427_4a0s1eip_138_1_1.vab
channel ORA_AUX_SBT_TAPE_4: starting datafile backup set restore
channel ORA_AUX_SBT_TAPE_4: specifying datafile(s) to restore from backup set
channel ORA_AUX_SBT_TAPE_4: restoring datafile 00018 to +DATAC1
channel ORA_AUX_SBT_TAPE_4: restoring datafile 00020 to +DATAC1
channel ORA_AUX_SBT_TAPE_4: reading from backup piece 850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
DB01_20220427_4b0s1eiq_139_1_1.vab
channel ORA_AUX_SBT_TAPE_1: piece handle=850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
DB01_20220427_490s1ehc_137_1_1.vab tag=TAG20220427T222651
channel ORA_AUX_SBT_TAPE_1: restored backup piece 1
channel ORA_AUX_SBT_TAPE_1: restore complete, elapsed time: 00:00:16
channel ORA_AUX_SBT_TAPE_1: starting datafile backup set restore
channel ORA_AUX_SBT_TAPE_1: specifying datafile(s) to restore from backup set
channel ORA_AUX_SBT_TAPE_1: restoring datafile 00024 to +DATAC1
channel ORA_AUX_SBT_TAPE_1: restoring datafile 00019 to +DATAC1
channel ORA_AUX_SBT_TAPE_1: reading from backup piece 850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
DB01_20220427_4c0s1ejk_140_1_1.vab
channel ORA_AUX_SBT_TAPE_3: piece handle=850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
DB01_20220427_4a0s1eip_138_1_1.vab tag=TAG20220427T222651
channel ORA_AUX_SBT_TAPE_3: restored backup piece 1
channel ORA_AUX_SBT_TAPE_3: restore complete, elapsed time: 00:00:16
channel ORA_AUX_SBT_TAPE_3: starting datafile backup set restore
channel ORA_AUX_SBT_TAPE_3: specifying datafile(s) to restore from backup set
channel ORA_AUX_SBT_TAPE_3: restoring datafile 00027 to +DATAC1
```

```
channel ORA_AUX_SBT_TAPE_3: reading from backup piece 850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
DB01_20220427_470s1ehc_135_1_1.vab

channel ORA_AUX_SBT_TAPE_4: piece handle=850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
DB01_20220427_4b0s1eiq_139_1_1.vab tag=TAG20220427T222651

channel ORA_AUX_SBT_TAPE_4: restored backup piece 1

channel ORA_AUX_SBT_TAPE_4: restore complete, elapsed time: 00:00:16

channel ORA_AUX_SBT_TAPE_2: piece handle=850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
DB01_20220427_480s1ehc_136_1_1.vab tag=TAG20220427T222651

channel ORA_AUX_SBT_TAPE_2: restored backup piece 1

channel ORA_AUX_SBT_TAPE_2: restore complete, elapsed time: 00:00:19

channel ORA_AUX_SBT_TAPE_1: piece handle=850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
DB01_20220427_4c0s1ejk_140_1_1.vab tag=TAG20220427T222651

channel ORA_AUX_SBT_TAPE_1: restored backup piece 1

channel ORA_AUX_SBT_TAPE_1: restore complete, elapsed time: 00:00:15

channel ORA_AUX_SBT_TAPE_3: piece handle=850a30a0-2ed7-49ac-a912-05015de184bd/RMAN_1723239724_
DB01_20220427_470s1ehc_135_1_1.vab tag=TAG20220427T222651

channel ORA_AUX_SBT_TAPE_3: restored backup piece 1

channel ORA_AUX_SBT_TAPE_3: restore complete, elapsed time: 00:00:45

Finished restore at 27-APR-22


datafile 27 switched to datafile copy

input datafile copy RECID=11 STAMP=1103151401 file name=+DATAC1/DB01/D487A74818F3198DE0530C7219ACE40E/DATA-
FILE/users.348.1103151397

datafile 18 switched to datafile copy

input datafile copy RECID=12 STAMP=1103151401 file name=+DATAC1/DB01/D487A74818F3198DE0530C7219ACE40E/DATA-
FILE/system.310.1103151349

datafile 1 switched to datafile copy

input datafile copy RECID=13 STAMP=1103151401 file name=+DATAC1/DB01/DATAFILE/system.307.1103151345

datafile 20 switched to datafile copy

input datafile copy RECID=14 STAMP=1103151401 file name=+DATAC1/DB01/D487A74818F3198DE0530C7219ACE40E/DATA-
FILE/undotbs1.320.1103151349

datafile 5 switched to datafile copy

input datafile copy RECID=15 STAMP=1103151401 file name=+DATAC1/DB01/DATAFILE/undotbs1.306.1103151345

datafile 7 switched to datafile copy

input datafile copy RECID=16 STAMP=1103151401 file name=+DATAC1/DB01/DATAFILE/undotbs2.309.1103151347

datafile 24 switched to datafile copy

input datafile copy RECID=17 STAMP=1103151401 file name=+DATAC1/DB01/D487A74818F3198DE0530C7219ACE40E/DATA-
FILE/undo_2.347.1103151361

datafile 3 switched to datafile copy

input datafile copy RECID=18 STAMP=1103151401 file name=+DATAC1/DB01/DATAFILE/sysaux.308.1103151345

datafile 19 switched to datafile copy

input datafile copy RECID=19 STAMP=1103151401 file name=+DATAC1/DB01/D487A74818F3198DE0530C7219ACE40E/DATA-
FILE/sysaux.346.1103151359
```

```
contents of Memory Script:

{

# set requested point in time

set until  time "to_date('27-apr-22 22:50:41','dd-mon-rr hh24:mi:ss')";

# online the datafiles restored or switched

sql clone 'MAXITPCH' "alter database datafile

 18 online";

sql clone "alter database datafile  1 online";

sql clone 'MAXITPCH' "alter database datafile

 20 online";

sql clone "alter database datafile  5 online";

sql clone "alter database datafile  7 online";

sql clone 'MAXITPCH' "alter database datafile

 24 online";

sql clone "alter database datafile  3 online";

sql clone 'MAXITPCH' "alter database datafile

 19 online";

sql clone 'MAXITPCH' "alter database datafile

 27 online";

# recover and open resetlogs

recover clone database tablespace  "MAXITPCH":"USERS", "MAXITPCH":"SYSTEM", "SYSTEM", "MAXITPCH":"UNDOTBS1",
"UNDOTBS1", "UNDOTBS2", "MAXITPCH":"UNDO_2", "SYSAUX", "MAXITPCH":"SYSAUX" delete archivelog;

alter clone database open resetlogs;

}

executing Memory Script


executing command: SET until clause


sql statement: alter database datafile  18 online


sql statement: alter database datafile  1 online


sql statement: alter database datafile  20 online


sql statement: alter database datafile  5 online


sql statement: alter database datafile  7 online


sql statement: alter database datafile  24 online


sql statement: alter database datafile  3 online


sql statement: alter database datafile  19 online
```

```
sql statement: alter database datafile  27 online


Starting recover at 27-APR-22
using channel ORA_AUX_SBT_TAPE_1
using channel ORA_AUX_SBT_TAPE_2
using channel ORA_AUX_SBT_TAPE_3
using channel ORA_AUX_SBT_TAPE_4
using channel ORA_AUX_DISK_1


Executing: alter database datafile 8 offline
Executing: alter database datafile 2, 4, 6 offline
Executing: alter database datafile 25, 26 offline
starting media recovery


archived log for thread 1 with sequence 834 is already on disk as file +RECOC1/DB01/ARCHIVELOG/2022_04_27/
thread_1_seq_834.3762.1103150875
archived log for thread 1 with sequence 835 is already on disk as file +RECOC1/DB01/ARCHIVELOG/2022_04_27/
thread_1_seq_835.3759.1103151257
archived log for thread 2 with sequence 2637 is already on disk as file +RECOC1/DB01/ARCHIVELOG/2022_04_27/
thread_2_seq_2637.3761.1103150875
archived log for thread 2 with sequence 2638 is already on disk as file +RECOC1/DB01/ARCHIVELOG/2022_04_27/
thread_2_seq_2638.3758.1103151257
archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_04_27/thread_1_seq_834.3762.1103150875 thread=1 se-
quence=834
archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_04_27/thread_2_seq_2637.3761.1103150875 thread=2 se-
quence=2637
archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_04_27/thread_1_seq_835.3759.1103151257 thread=1 se-
quence=835
archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_04_27/thread_2_seq_2638.3758.1103151257 thread=2 se-
quence=2638
media recovery complete, elapsed time: 00:00:02
Finished recover at 27-APR-22


database opened


contents of Memory Script:
{
sql clone 'alter pluggable database  MAXITPCH open';
}
executing Memory Script


sql statement: alter pluggable database  MAXITPCH open
```

```
contents of Memory Script:
{
# make read only the tablespace that will be exported
sql clone 'MAXITPCH' 'alter tablespace
 USERS read only';
# create directory for datapump import
sql 'MAXITPCH' "create or replace directory
TSPITR_DIROBJ_DPDIR as ''
+DATAC1'''";
# create directory for datapump export
sql clone 'MAXITPCH' "create or replace directory
TSPITR_DIROBJ_DPDIR as ''
+DATAC1'''";
}
executing Memory Script


sql statement: alter tablespace  USERS read only


sql statement: create or replace directory TSPITR_DIROBJ_DPDIR as ''+DATAC1''


sql statement: create or replace directory TSPITR_DIROBJ_DPDIR as ''+DATAC1''


Performing export of metadata...
   EXPDP> Starting "SYS"."TSPITR_EXP_Cylb_iixk":
   EXPDP> Processing object type TRANSPORTABLE_EXPORT/STATISTICS/TABLE_STATISTICS
   EXPDP> Processing object type TRANSPORTABLE_EXPORT/STATISTICS/MARKER
   EXPDP> Processing object type TRANSPORTABLE_EXPORT/PLUGTS_BLK
   EXPDP> Processing object type TRANSPORTABLE_EXPORT/POST_INSTANCE/PLUGTS_BLK
   EXPDP> Processing object type TRANSPORTABLE_EXPORT/TABLE
   EXPDP> Master table "SYS"."TSPITR_EXP_Cylb_iixk" successfully loaded/unloaded
   EXPDP> ****************************************************************************
   EXPDP> Dump file set for SYS.TSPITR_EXP_Cylb_iixk is:
   EXPDP>   +DATAC1/tspitr_cylb_89200.dmp
   EXPDP> ****************************************************************************
   EXPDP> Datafiles required for transportable tablespace USERS:
   EXPDP>   +DATAC1/DB01/D487A74818F3198DE0530C7219ACE40E/DATAFILE/users.348.1103151397
   EXPDP> Job "SYS"."TSPITR_EXP_Cylb_iixk" successfully completed at Wed Apr 27 22:57:46 2022 elapsed 0
00:00:28
Export completed
```

```
contents of Memory Script:

{

# shutdown clone before import

shutdown clone abort

}

executing Memory Script


Oracle instance shut down


Performing import of metadata...

    IMPDP> Master table "SYS"."TSPITR_IMP_Cylb_jlmu" successfully loaded/unloaded

    IMPDP> Starting "SYS"."TSPITR_IMP_Cylb_jlmu":

    IMPDP> Processing object type TRANSPORTABLE_EXPORT/PLUGTS_BLK

    IMPDP> Processing object type TRANSPORTABLE_EXPORT/TABLE

    IMPDP> Processing object type TRANSPORTABLE_EXPORT/STATISTICS/TABLE_STATISTICS

    IMPDP> Processing object type TRANSPORTABLE_EXPORT/STATISTICS/MARKER

    IMPDP> Processing object type TRANSPORTABLE_EXPORT/POST_INSTANCE/PLUGTS_BLK

    IMPDP> Job "SYS"."TSPITR_IMP_Cylb_jlmu" successfully completed at Wed Apr 27 22:58:27 2022 elapsed 0
00:00:31

Import completed


contents of Memory Script:

{

# make read write and offline the imported tablespaces

sql 'MAXITPCH' 'alter tablespace

 USERS read write';

sql 'MAXITPCH' 'alter tablespace

 USERS offline';

# enable autobackups after TSPITR is finished

sql 'begin dbms_backup_restore.AutoBackupFlag(TRUE); end;';

# resync catalog

resync catalog;

}

executing Memory Script


sql statement: alter tablespace  USERS read write


sql statement: alter tablespace  USERS offline


sql statement: begin dbms_backup_restore.AutoBackupFlag(TRUE); end;


starting full resync of recovery catalog

full resync complete
```

```
Removing automatic instance
Automatic instance removed
auxiliary instance file +DATAC1/DB01/D487A74818F3198DE0530C7219ACE40E/TEMPFILE/temp.358.1103151427 deleted
auxiliary instance file +DATAC1/DB01/TEMPFILE/temp.357.1103151423 deleted
auxiliary instance file +DATAC1/DB01/ONLINELOG/group_16.356.1103151413 deleted
auxiliary instance file +DATAC1/DB01/ONLINELOG/group_15.355.1103151411 deleted
auxiliary instance file +DATAC1/DB01/ONLINELOG/group_12.354.1103151411 deleted
auxiliary instance file +DATAC1/DB01/ONLINELOG/group_11.353.1103151411 deleted
auxiliary instance file +DATAC1/DB01/ONLINELOG/group_6.352.1103151409 deleted
auxiliary instance file +DATAC1/DB01/ONLINELOG/group_5.351.1103151409 deleted
auxiliary instance file +DATAC1/DB01/ONLINELOG/group_2.350.1103151409 deleted
auxiliary instance file +DATAC1/DB01/ONLINELOG/group_1.349.1103151409 deleted
auxiliary instance file +DATAC1/DB01/D487A74818F3198DE0530C7219ACE40E/DATAFILE/sysaux.346.1103151359 deleted
auxiliary instance file +DATAC1/DB01/DATAFILE/sysaux.308.1103151345 deleted
auxiliary instance file +DATAC1/DB01/D487A74818F3198DE0530C7219ACE40E/DATAFILE/undo_2.347.1103151361 deleted
auxiliary instance file +DATAC1/DB01/DATAFILE/undotbs2.309.1103151347 deleted
auxiliary instance file +DATAC1/DB01/DATAFILE/undotbs1.306.1103151345 deleted
auxiliary instance file +DATAC1/DB01/D487A74818F3198DE0530C7219ACE40E/DATAFILE/undotbs1.320.1103151349 deleted
auxiliary instance file +DATAC1/DB01/DATAFILE/system.307.1103151345 deleted
auxiliary instance file +DATAC1/DB01/D487A74818F3198DE0530C7219ACE40E/DATAFILE/system.310.1103151349 deleted
auxiliary instance file +DATAC1/DB01/CONTROLFILE/current.305.1103151327 deleted
auxiliary instance file tspitr_Cylb_89200.dmp deleted
Finished recover at 27-APR-22


RMAN>


SQL> select tablespace_name, status from dba_tablespaces;


TABLESPACE_NAME                STATUS
------------------------------ ---------
SYSTEM                         ONLINE
SYSAUX                         ONLINE
UNDOTBS1                       ONLINE
TEMP                           ONLINE
TPCH_DATA                      ONLINE
UNDO_2                         ONLINE
TPCH_IDX                       ONLINE
USERS                          OFFLINE


8 rows selected.
```

```
SQL> alter tablespace users online;


Tablespace altered.


SQL> select count(*) from hr.test;


  COUNT(*)
----------
     23937
```

Scenario 6.3.1: Special Situation: Loss of Database's SPFILE

```
[oracle@pdcxdt01-db01 rman_work]$ srvctl start database -db db01
```

PRCR-1079 : Failed to start resource ora.db01.db

CRS-5017: The resource action "ora.db01.db start" encountered the following error:

ORA-01078: failure in processing system parameters

LRM-00109: could not open parameter file '/u01/app/oracle/dbs/initdb011.ora'

. For details refer to "(:CLSN00107:)" in "/u01/app/oracle/diag/crs/pdcxdt01-db01/crs/trace/crsd_oraagent_oracle.trc".

CRS-5017: The resource action "ora.db01.db start" encountered the following error:

ORA-01078: failure in processing system parameters

LRM-00109: could not open parameter file '/u01/app/oracle/dbs/initdb012.ora'

. For details refer to "(:CLSN00107:)" in "/u01/app/oracle/diag/crs/pdcxdt01-db02/crs/trace/crsd_oraagent_oracle.trc".

CRS-2674: Start of 'ora.db01.db' on 'pdcxdt01-db01' failed

CRS-2632: There are no more servers to try to place resource 'ora.db01.db' on that would satisfy its placement policy

CRS-2674: Start of 'ora.db01.db' on 'pdcxdt01-db02' failed

```
[oracle@pdcxdt01-db01 rman_work]$ rman target / catalog=rcat@rcat
```


Recovery Manager: Release 21.0.0.0.0 — Production on Tue Feb 15 04:31:41 2022

Version 21.4.0.0.0

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connected to target database (not started)

recovery catalog database Password:

connected to recovery catalog database


```
RMAN> set dbid 1723239724;
```


executing command: SET DBID

database name is "DB01" and DBID is 1723239724

```
RMAN> startup nomount force;


startup failed: ORA-01078: failure in processing system parameters
LRM-00109: could not open parameter file '/u01/app/oracle/dbs/initdb011.ora'


starting Oracle instance without parameter file for retrieval of spfile
Oracle instance started


Total System Global Area    4287889408 bytes


Fixed Size                     9699328 bytes
Variable Size               2634022912 bytes
Database Buffers            1509949440 bytes
Redo Buffers                 134217728 bytes


RMAN> restore spfile to '+DATAC1/DB01/PARAMETERFILE/spfile.272.1091973629';


Starting restore at 2022/02/15 04:34:51
allocated channel: ORA_SBT_TAPE_1
channel ORA_SBT_TAPE_1: SID=127 device type=SBT_TAPE
channel ORA_SBT_TAPE_1: Veeam Plug-in for Oracle RMAN
allocated channel: ORA_SBT_TAPE_2
channel ORA_SBT_TAPE_2: SID=251 device type=SBT_TAPE
channel ORA_SBT_TAPE_2: Veeam Plug-in for Oracle RMAN
allocated channel: ORA_SBT_TAPE_3
channel ORA_SBT_TAPE_3: SID=375 device type=SBT_TAPE
channel ORA_SBT_TAPE_3: Veeam Plug-in for Oracle RMAN
allocated channel: ORA_SBT_TAPE_4
channel ORA_SBT_TAPE_4: SID=499 device type=SBT_TAPE
channel ORA_SBT_TAPE_4: Veeam Plug-in for Oracle RMAN
allocated channel: ORA_DISK_1
channel ORA_DISK_1: SID=623 device type=DISK


channel ORA_SBT_TAPE_1: starting datafile backup set restore
channel ORA_SBT_TAPE_1: restoring SPFILE
output file name=+DATAC1/DB01/PARAMETERFILE/spfile.272.1091973629
channel ORA_SBT_TAPE_1: reading from backup piece c-1723239724-20220215-04_RMAN_AUTOBACKUP.vab
channel ORA_SBT_TAPE_1: piece handle=c-1723239724-20220215-04_RMAN_AUTOBACKUP.vab tag=TAG20220215T041348
channel ORA_SBT_TAPE_1: restored backup piece 1
channel ORA_SBT_TAPE_1: restore complete, elapsed time: 00:00:45
Finished restore at 2022/02/15 04:35:47


RMAN> exit
```

```
Recovery Manager complete.

[oracle@pdcxdt01-db01 rman_work]$ srvctl stop database -db db01

[oracle@pdcxdt01-db01 rman_work]$ srvctl start database -db db01

[oracle@pdcxdt01-db01 rman_work]$ srvctl status database -db db01

Instance db011 is running on node pdcxdt01-db01

Instance db012 is running on node pdcxdt01-db02
```

Scenario 6.3.2: Special Situation: Recover from Loss of All Copies of Database's Control File

Recovery Manager: Release 21.0.0.0.0 — Production on Mon Feb 14 14:44:31 2022

```
[oracle@pdcxdt01-db01 rman_work]$ srvctl start database -db db01

PRCR-1079 : Failed to start resource ora.db01.db

CRS-5017: The resource action "ora.db01.db start" encountered the following error:

ORA-00205: error in identifying control file, check alert log for more info

. For details refer to "(:CLSN00107:)" in "/u01/app/oracle/diag/crs/pdcxdt01-db01/crs/trace/crsd_oraagent_
oracle.trc".


CRS-5017: The resource action "ora.db01.db start" encountered the following error:

ORA-00205: error in identifying control file, check alert log for more info

. For details refer to "(:CLSN00107:)" in "/u01/app/oracle/diag/crs/pdcxdt01-db02/crs/trace/crsd_oraagent_
oracle.trc".


CRS-2674: Start of 'ora.db01.db' on 'pdcxdt01-db01' failed

CRS-2632: There are no more servers to try to place resource 'ora.db01.db' on that would satisfy its place-
ment policy

CRS-2674: Start of 'ora.db01.db' on 'pdcxdt01-db02' failed

[oracle@pdcxdt01-db01 rman_work]$ rman target / catalog=rcat@rcat
```

Recovery Manager: Release 21.0.0.0.0 — Production on Tue Feb 15 04:53:36 2022

Version 21.4.0.0.0

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connected to target database: DB01 (not mounted)

recovery catalog database Password:

connected to recovery catalog database

```
RMAN> restore controlfile;


Starting restore at 2022/02/15 04:53:47

allocated channel: ORA_SBT_TAPE_1

channel ORA_SBT_TAPE_1: SID=1681 instance=db011 device type=SBT_TAPE

channel ORA_SBT_TAPE_1: Veeam Plug-in for Oracle RMAN
```

```
allocated channel: ORA_SBT_TAPE_2

channel ORA_SBT_TAPE_2: SID=1767 instance=db011 device type=SBT_TAPE

channel ORA_SBT_TAPE_2: Veeam Plug-in for Oracle RMAN

allocated channel: ORA_SBT_TAPE_3

channel ORA_SBT_TAPE_3: SID=1853 instance=db011 device type=SBT_TAPE

channel ORA_SBT_TAPE_3: Veeam Plug-in for Oracle RMAN

allocated channel: ORA_SBT_TAPE_4

channel ORA_SBT_TAPE_4: SID=1939 instance=db011 device type=SBT_TAPE

channel ORA_SBT_TAPE_4: Veeam Plug-in for Oracle RMAN

allocated channel: ORA_DISK_1

channel ORA_DISK_1: SID=2025 instance=db011 device type=DISK


channel ORA_SBT_TAPE_1: starting datafile backup set restore

channel ORA_SBT_TAPE_1: restoring control file

channel ORA_SBT_TAPE_1: reading from backup piece c-1723239724-20220215-04_RMAN_AUTOBACKUP.vab

channel ORA_SBT_TAPE_1: piece handle=c-1723239724-20220215-04_RMAN_AUTOBACKUP.vab tag=TAG20220215T041348

channel ORA_SBT_TAPE_1: restored backup piece 1

channel ORA_SBT_TAPE_1: restore complete, elapsed time: 00:00:46

output file name=+DATAC1/DB01/CONTROLFILE/current.257.1096692877

Finished restore at 2022/02/15 04:54:43


RMAN> alter database mount;


database mounted


RMAN> recover database;


Starting recover at 2022/02/15 04:57:21

Starting implicit crosscheck backup at 2022/02/15 04:57:21

allocated channel: ORA_DISK_1

Finished implicit crosscheck backup at 2022/02/15 04:57:21


Starting implicit crosscheck copy at 2022/02/15 04:57:21

using channel ORA_DISK_1

Finished implicit crosscheck copy at 2022/02/15 04:57:21


searching for all files in the recovery area

cataloging files...

cataloging done
```

```
List of Cataloged Files
=======================
File Name: +RECOC1/DB01/snapcf_db01.f


allocated channel: ORA_SBT_TAPE_1
channel ORA_SBT_TAPE_1: SID=264 instance=db011 device type=SBT_TAPE
channel ORA_SBT_TAPE_1: Veeam Plug-in for Oracle RMAN
allocated channel: ORA_SBT_TAPE_2
channel ORA_SBT_TAPE_2: SID=1770 instance=db011 device type=SBT_TAPE
channel ORA_SBT_TAPE_2: Veeam Plug-in for Oracle RMAN
allocated channel: ORA_SBT_TAPE_3
channel ORA_SBT_TAPE_3: SID=1941 instance=db011 device type=SBT_TAPE
channel ORA_SBT_TAPE_3: Veeam Plug-in for Oracle RMAN
allocated channel: ORA_SBT_TAPE_4
channel ORA_SBT_TAPE_4: SID=2027 instance=db011 device type=SBT_TAPE
channel ORA_SBT_TAPE_4: Veeam Plug-in for Oracle RMAN
using channel ORA_DISK_1


starting media recovery


archived log for thread 1 with sequence 3 is already on disk as file +DATAC1/DB01/ONLINELOG/
group_5.316.1096687841
archived log for thread 2 with sequence 1 is already on disk as file +RECOC1/DB01/ARCHIVELOG/2022_02_15/
thread_2_seq_1.271.1096691953
archived log file name=+DATAC1/DB01/ONLINELOG/group_5.316.1096687841 thread=1 sequence=3
archived log file name=+RECOC1/DB01/ARCHIVELOG/2022_02_15/thread_2_seq_1.271.1096691953 thread=2 sequence=1
Finished recover at 2022/02/15 04:57:35


RMAN> alter database open resetlogs;


Statement processed
new incarnation of database registered in recovery catalog
starting full resync of recovery catalog
full resync complete


RMAN> exit


Recovery Manager complete.
[oracle@pdcxdt01-db01 rman_work]$ srvctl stop database -db db01
[oracle@pdcxdt01-db01 rman_work]$ srvctl start database -db db01
[oracle@pdcxdt01-db01 rman_work]$ srvctl status database -db db01
Instance db011 is running on node pdcxdt01-db01
Instance db012 is running on node pdcxdt01-db02
```