

ORACLE®



Read-only Transportable Tablespaces 11g <> 12c

Bodo von Neuhaus
Leitender Systemberater
ORACLE Deutschland B.V. & Co. KG

Agenda

- 1 Transportable Tablespaces Allgemein
- 2 Unterschiede 11g zu 12c
- 3 Demo

Agenda

- 1 Transportable Tablespaces Allgemein
- 2 Unterschiede 11g zu 12c
- 3 Demo

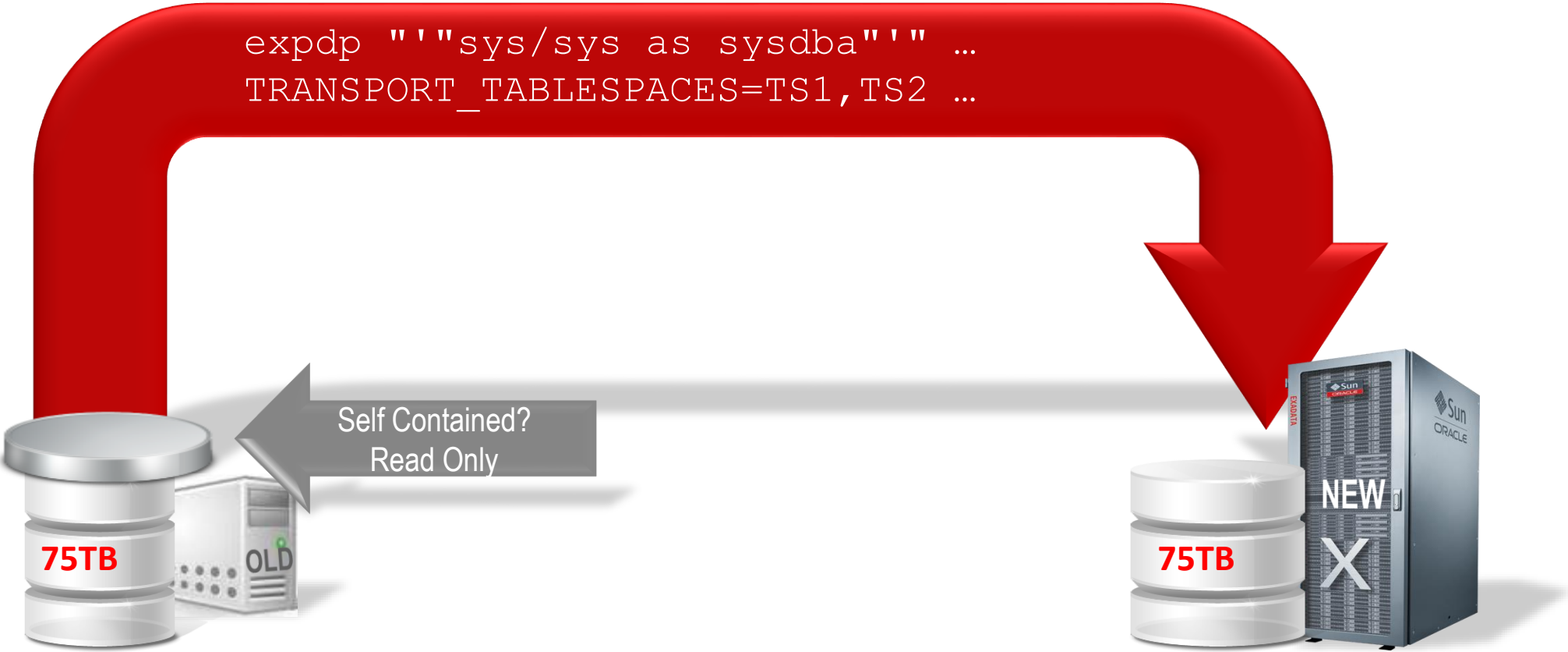
Datentransport bei Oracle

Möglichkeiten

- SQL über DB-Link
- Data Pump
- „Spool“ / SQL*Loader
- Transportable Tablespace
- Transportable Database
- Extraktion aus Backup
- Data Guard Standby
- Golden Gate / Streams / Advanced Queuing



Konzept Transportable Tablespaces



Konzept Transportable Tablespaces

```
impdp "'sys/sys as sysdba"'...  
TRANSPORT_DATAFILES=...
```

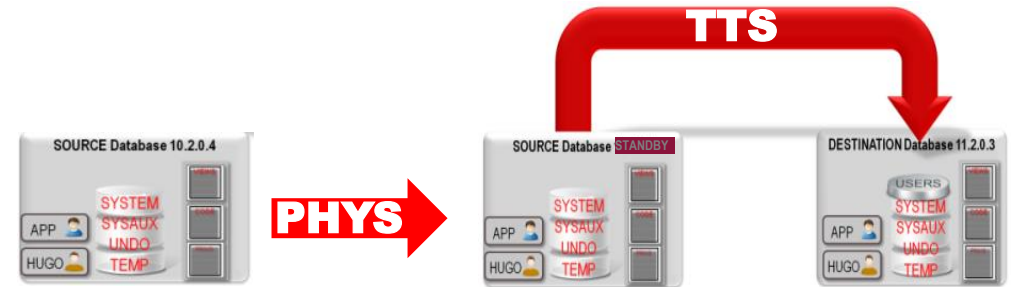
- TTS Funktionalität verfügbar seit Oracle 8i
- Cross Plattform Support seit Oracle 10g



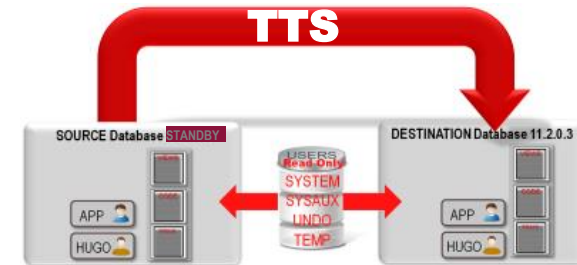
Transportable Tablespaces Varianten

- Vermeidung von physikalischen Kopien

- Benutze eine Physical Standby als Transport Quelle



- Mount von zwei Seiten gleichzeitig



- Oracle 11g:

- TSP kann von zwei DBen “ge-mounted” werden zur gleichen Zeit, solange dieser auf Read-only gesetzt ist

- **Oracle 12c: Dies hat sich geändert - Read-only muss auf OS level realisiert werden!**

- Nur mit original TTS, funktioniert nicht mit Full Transportable

- Voraussetzungen:

- Timezone Versionen müssen identisch sein

- Sonst wird Data Pump den Meta Import blocken

Anwendungsbeispiel (11g)

- Täglicher Transport von Daten aus der OLTP Produktion in eine Auswertungsdatenbank

1. TSP Read-only setzen
2. Transportable Tablespace (read-only)
3. Auslesen der Daten aus dem TSP (read-only)
4. Abhängen bzw. Entfernen des TSP aus der Auswertungsumgebung
5. TSP Read-write setzen

OLTP
Produktiv



①

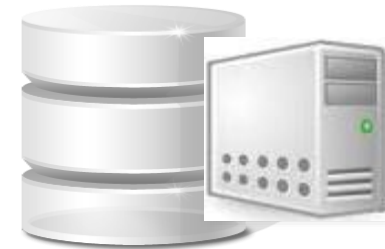
⑤



② ③ ④



Auswertung



Agenda

- 1 Transportable Tablespaces Allgemein
- 2 Unterschiede 11g zu 12c
- 3 Demo

Transportable TSP read-only 11g <> 12c

- Upgrade Blog Eintrag
 - [Transportable Tablespaces and READ ONLY in Oracle Database 12c](#)
- What Changed?
- Starting in 12.1, **data pump sets tablespaces read write** during the import phase of a transportable tablespace migration. This means that a tablespace cannot be hooked into two different databases at the same time using transportable tablespaces.

Transportable TSP read-only 11g <> 12c

- Upgrade Blog Eintrag

- [Transportable Tablespaces and READ ONLY in Oracle Database 12c](#)

- Why Was This Change Made?

- First, as databases have grown, we encountered performance hits when dealing with tablespaces that contain many partitions or subpartitions for either tables or indexes. The reason for this (apologies if this gets too deep) is that we try to ensure that we can reclaim free space in cases where a tablespace is being moved, but where not all tables within that tablespace are part of the operation. For example, you could move a tablespace data file which includes partitions from 5 tables, but you may be interested in only 2 of those tables. The segments used by the other 3 tables would be dead space that we should reclaim.

Prior to 12c, we would reclaim this space by first recording all the segments being exported during the export phase, and then those imported during the import phase. This allowed us to free up all the space for segments that were *not* imported. This worked, but as bigfile tablespaces grew into the tens of terabytes, performance really suffered. We ran into cases where all that accounting for segments took literally days. In 12c we implemented a different technique where we no longer record the segments on export (this is available as a backport to 11g as well), and then upon import we recompute the bitmap for the tablespace. Recomputing the bitmap means calling `DBMS_SPACE_ADMIN.TABLESPACE_REBUILD_BITMAPS`, and generally takes a matter of seconds compared to the previous method which could take hours.

Therefore, this change is a very large performance improvement for both export and import of transportable tablespaces when there are large numbers of data segments involved.

Transportable TSP read-only 11g <> 12c

- Upgrade Blog Eintrag
 - [Transportable Tablespaces and READ ONLY in Oracle Database 12c](#)
- Why Was This Change Made?
- The second reason for this change was to enable transportable tablespaces to handle import of a tablespace into a database that used a different version of Timestamp with Timezone (TSTZ) data. Prior to 12c, there were many restrictions on moving TSTZ data between databases. We have progressively been able to relax and eliminate these restrictions over time.
- MOS Note 2094476.1
 - Workaround: Data File auf OS-Level read-only setzen

Transportable TSP read-only 11g <> 12c

```
impdp transport_datafiles='/u02/ttsdf.dbf' directory=<directory_name> dumpfile=<dumpfile_name> logfile=<logfile_name>
```

In 11g and lower versions, this will get succeeded. But in 12c, this will fail with ORA-19721.

i.e. In 11g, we were able to reattach, but not in 12c. We have filed a bug# 21828154 with Oracle Development to get clarification.

SOLUTION

Oracle Development declared it as "Expected Behavior"

Starting from 12.1, during the TTS import operation, the tablespaces (datafile headers) are put into read-write mode intermittently in order to fix up TSTZ table columns and clean up unused segments in the datafiles. This functionality was implemented on many customer's request basis. And, hence, this cannot be reversed. Note that, it intermittently only changes the status to "read-write" and the final status will still be "read-only" only.

Oracle Development also said that there is a simple workaround available.

i.e. Set the datafile permission to read-only status at OS level before the first import itself. For example: `chmod 440 <datafile>`

This will make sure that the subsequent TTS Import on the read-only tablespaces will get succeeded as like in 11g.

Workaround for ASM files

Set ASM file permission to read-only on ASM instance before the first import itself.

```
SQL> ALTER DISKGROUP <Disk Group> SET PERMISSION OWNER=Read only, GROUP=Read only, OTHER=Read only FOR FILE '<ASM File>';
```

Setting ASM file permission requires `compatible.rdbms >= 11.2.0.0.0` and `access_control.enabled = TRUE`.

```
SQL> ALTER DISKGROUP <Disk Group> SET ATTRIBUTE 'compatible.rdbms' = '11.2.0.0.0';  
SQL> ALTER DISKGROUP <Disk Group> SET ATTRIBUTE 'access_control.enabled' = 'true';
```

If impdp fails with ORA-15260, then try to add the OS user who issues impdp to the disk group.

```
SQL> ALTER DISKGROUP <Disk Group> ADD USER '<OS User>';
```

The above explained scenario is applicable ONLY for TTS Import, and not for FULL-TTS Import.

This is because, in TTS Import, the final status of tablespace is set to READ-ONLY though it intermittently changes the status to READ-WRITE.

Whereas, in FULL-TTS Import, Oracle by default sets the final status of tablespaces to READ-WRITE once the import operation is completed. And so, this concept is not applicable for FULL-TTS.

Also, note that if you face ORA-19721 on the first time TTS import itself, then the cause would be different and You are requested to raise an SR with Oracle Support.

Agenda

- 1 Transportable Tablespaces Allgemein
- 2 Unterschiede 11g zu 12c
- 3 Demo

Testen des Workaround in der Oracle Cloud

Auf Basis eines Exadata Cloud Service

- Provisionierung von 2 Datenbanken in der Exadata Cloud
- Workaround aus MOS Note 2094476.1 testen

Testen des Workaround in der Oracle Cloud

Auf Basis eines Exadata Cloud Service

- Provisionierung von 2 Datenbanken in der Exadata Cloud
 - Vorbereitungen
 - Überprüfung der ASM Instanz
 - Datenbank Files
 - Dateisystem auf OS-Ebene / ACFS
 - Bereitstellung der Exadata Cloud Datenbank Service Instanzen
 - Überprüfung nach der Provisionierung
 - Dateisystem auf OS-Ebene / ACFS
 - Datenbank Files
 - Tablespace Encryption

Testen des Workaround in der Oracle Cloud

Auf Basis eines Exadata Cloud Service

- Workaround aus MOS Note 2094476.1 testen
 - Erstellen von Testdaten in der neuen DB
 - Export durchführen
 - Datafile auf ASM-Ebene auf read only setzen
 - Import in der Zieldatenbank durchführen
 - Erneuter Zugriff aus der Quelldatenbank

ORACLE®