EXPLORING ALL OPTIONS TO MOVE YOUR ORACLE DATABASES

TO THE ORACLE CLOUD

Alex Zaballa

accenture technology

ALEX ZABALLA

ORACLE ACE Director

CHRISTIAN, HUSBAND, FATHER, DBA, ACE DIRECTOR, WRITER AT OTN, SPEAKER AND BLOGGER.

325 – Including OPN

aws CERTIFIED

GUOB

http://alexzaballa.blogspot.com/

@alexzaballa

https://www.linkedin.com/in/alexzaballa

ORAWORLD

Copyright © 2018 Accenture. All rights reserved.

- Based in Dallas-TX (June, 2019 - Now)
- Worked for **3** years in **Brazil** as a Clipper/Delphi Developer (15 years old) 1997-1999
- Worked for **7** years in **Brazil** as an **Oracle Developer** 2000 – 2007
- Worked for **8** years in **Angola - Africa** as an **Oracle DBA** for the **Ministry of Finance**. 2007 – 2015
- Worked for **4** years in **Brazil** as an **Oracle DBA** for Accenture Enkitec Group. 2015 – 2019 (June,2019)

Copyright © 2018 Accenture. All rights reserved.

ACCENTURE ENKITEC GROUP
CAPABILITIES OVERVIEW

ELITE

- Global systems integrator focused on the Oracle platform
- Consultants average 15+ years of Oracle experience
- Worldwide specialist in Engineered Systems implementations
- 14 Oracle ACE members, specialist recognized by Oracle for their technical expertise

EXPERTISE

ORACLE SPECIALIZATIONS*

- Oracle Exadata
- Oracle Exalogic
- Oracle Database
- Oracle GoldenGate
- Oracle Data Integrator
- Oracle Database
- Oracle Data Warehouse
- Oracle Real Application Cluster
- Oracle Performance Tuning
- Oracle Database Security

ORACLE ENGINEERED SYSTEMS NUMBERS

- 700+ Oracle Engineered Systems which AEG have configured, patched or supported.
- 100+ AEG resources which have an average 15+ years of Oracle experience
- AEG Support across 9 countries
- 200 Oracle Engineered Systems (Exadata/Exalogic etc) currently under management directly by AEG
- 200+ customers in either the AEG Managed Services program or remote DBA program
- 50,000 Accenture Oracle IDC resources that can be leveraged for Level 1 & Level 2 support

SUCCESS

ORACLE Diamond Partner

ORACLE Diamond Partner Global Cloud Elite

UKOUG 2013 2014 Awards PARTNER OF THE YEAR AWARD GOLD WINNER

2013 Winner ORACLE Oracle Excellence Award SPECIALIZED PARTNER OF THE YEAR —NORTH AMERICA

THOUGHT LEADERSHIP

Our consultants have been published in multiple subject areas and additional online resources that demonstrate Accenture's experience and expertise with the OES platform

Copyright © 2018 Accenture. All rights reserved.

500+ TECHNICAL EXPERTS
HELPING PEERS GLOBALLY

ORACLE ACE PROGRAM

3 MEMBERSHIP TIERS

- Oracle ACE Director
- Oracle ACE
- Oracle ACE Associate

bit.ly/OracleACEProgram

CONNECT:

oracle-ace_ww@oracle.com

Facebook.com/oracleaces

@oracleace

ORACLE Developer Community

Nominate yourself or someone you know: **acenomination.oracle.com**

Copyright © 2018 Accenture. All rights reserved.

ORACLE DATABASE CLOUD
CLOUD 101

ON PREMISES

SAME ARCHITECTURE
SAME SOFTWARE
SAME SKILLS

ORACLE CLOUD

Copyright © 2018 Accenture. All rights reserved.

ORACLE DATABASE 18C/19C/20C ARE NOT AUTONOMOUS DATABASE

Autonomous Database:

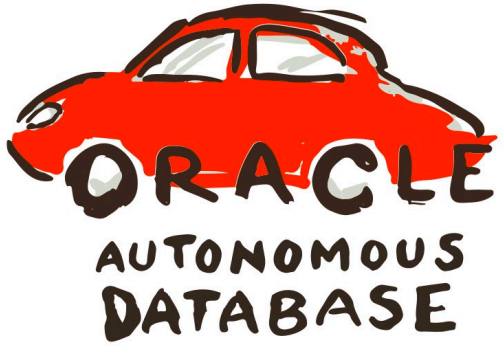
It's a **cloud service** that happens to use the Oracle 18c/19c database.

Oracle Database 18c/19c:

It's not autonomous!

https://oracle-base.com/blog/2018/01/03/oracle-database-18c-is-not-an-autonomous-database/

Copyright © 2018 Accenture. All rights reserved.



Will I lose my job?

Copyright © 2018 Accenture. All rights reserved.

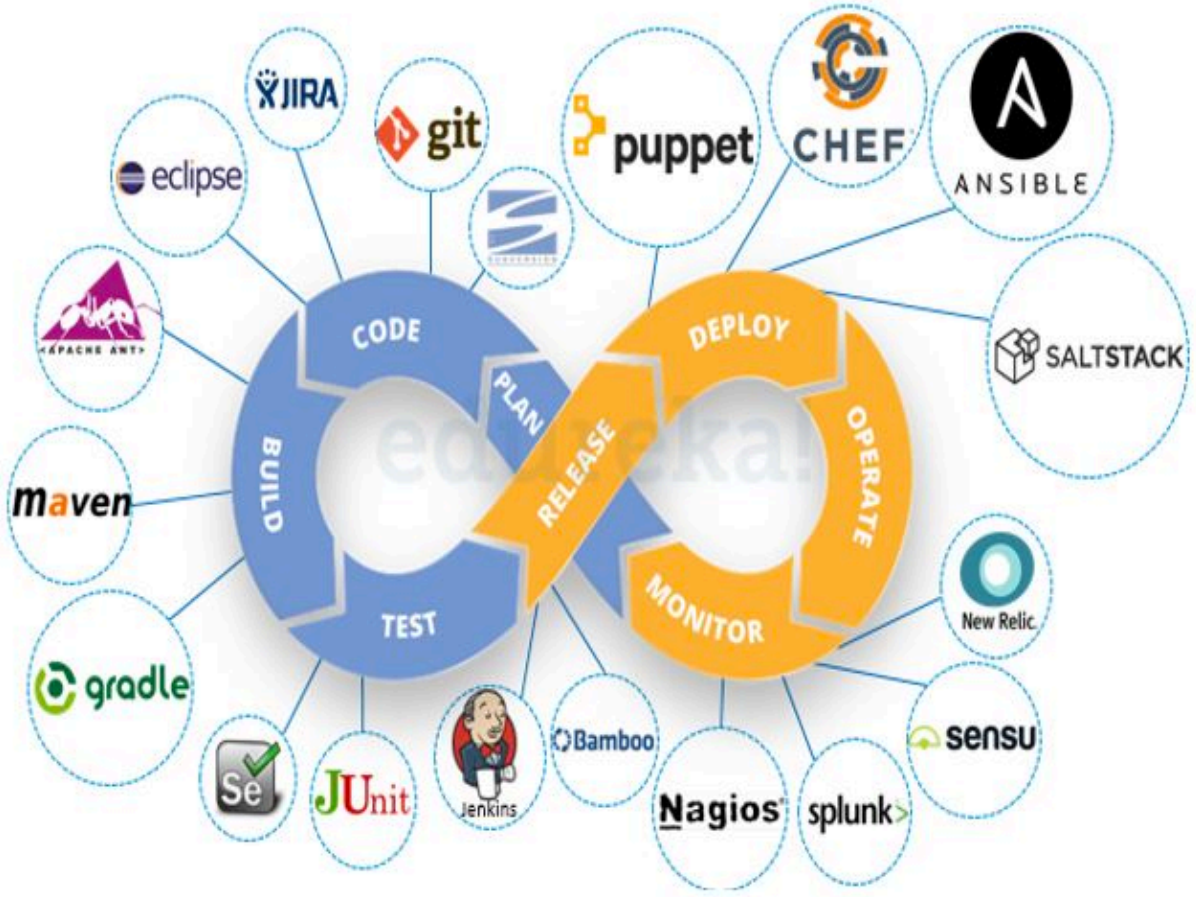
No!

But you have to learn new capabilities:

- **Application (Design and Development)**
- **Architecture**
- **Infrastructure (Network, Security and IaC)**

Copyright © 2018 Accenture. All rights reserved.

SOME TOOLS FOR INFRASTRUCTURE AUTOMATION INFRASTRUCTURE AS CODE



- OCI CLI
- Terraform
- Ansible

Copyright © 2018 Accenture. All rights reserved.

ORACLE DATABASE CLOUD

- Oracle Database Cloud Service - Virtual Machines / Bare Metal
- Oracle Database Exadata Cloud Service
- Oracle Database Exadata Cloud at Customer
- Autonomous Transaction Processing
- Autonomous Data Warehouse

- Oracle Database Exadata Express Cloud Service – Managed
- Oracle Database Schema Cloud Service - Managed

https://cloud.oracle.com/database

Copyright © 2018 Accenture. All rights reserved.

ORACLE DATABASE CLOUD SERVICE
DETERMINE THE COMPUTE SHAPE TO MOVE TO CLOUD

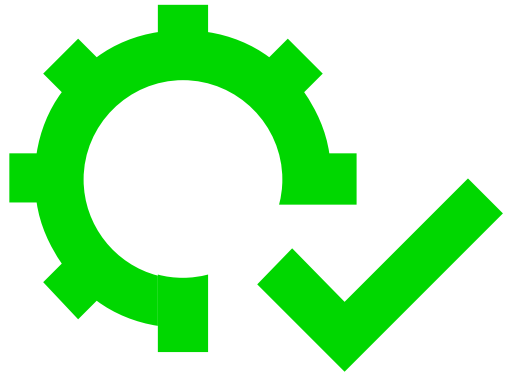
ORACLE DATABASE CLOUD SERVICE
DETERMINE COMPUTE SHAPE

I’m THE **DBA**

Copyright © 2018 Accenture. All rights reserved.

ORACLE DATABASE CLOUD SERVICE
DETERMINE COMPUTE SHAPE

I will use the same amount of CPUs
and memory that I have on-premises!



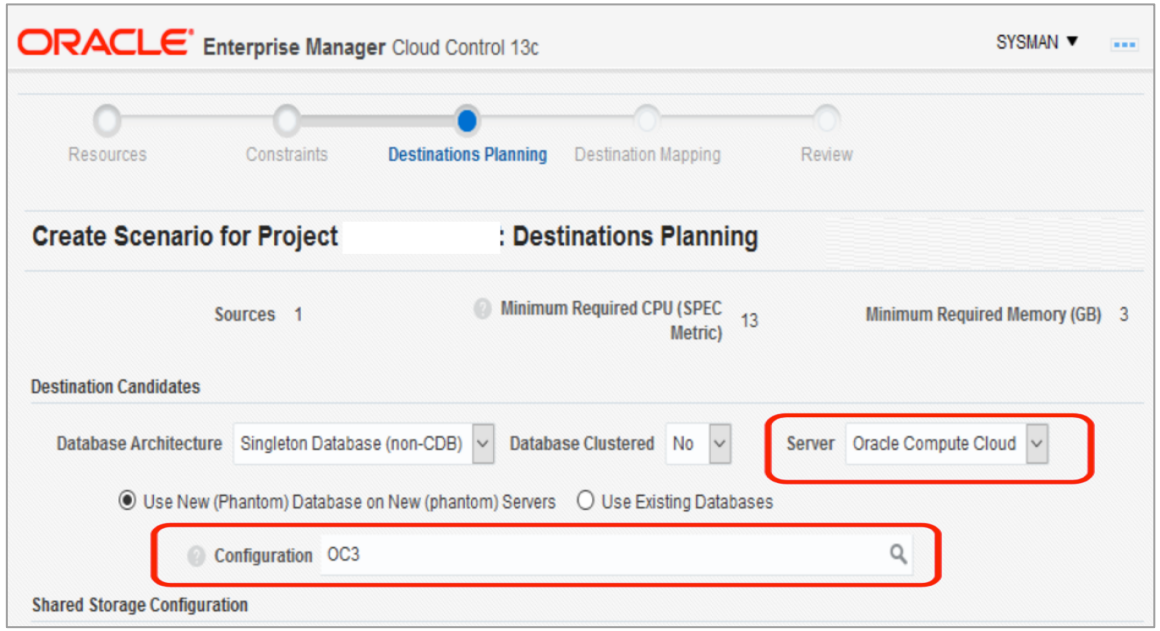
Copyright © 2018 Accenture. All rights reserved.

ORACLE DATABASE CLOUD SERVICE
DETERMINE COMPUTE SHAPE

Copyright © 2018 Accenture. All rights reserved.

ORACLE DATABASE CLOUD SERVICE
DETERMINE COMPUTE SHAPE

Use Database Consolidation Workbench



**Database Consolidation Workbench requires the Database Diagnostics pack license.

Copyright © 2018 Accenture. All rights reserved.

ORACLE DATABASE CLOUD SERVICE
DETERMINE COMPUTE SHAPE – MIG360

Copyright © 2018 Accenture. All rights reserved.

https://github.com/alexzaballa/migration360

ORACLE DATABASE CLOUD SERVICE
DETERMINE COMPUTE SHAPE

Ok!

Now we have the definition of CPUs, Memory and Storage equivalent in the Oracle Cloud.

Copyright © 2018 Accenture. All rights reserved.

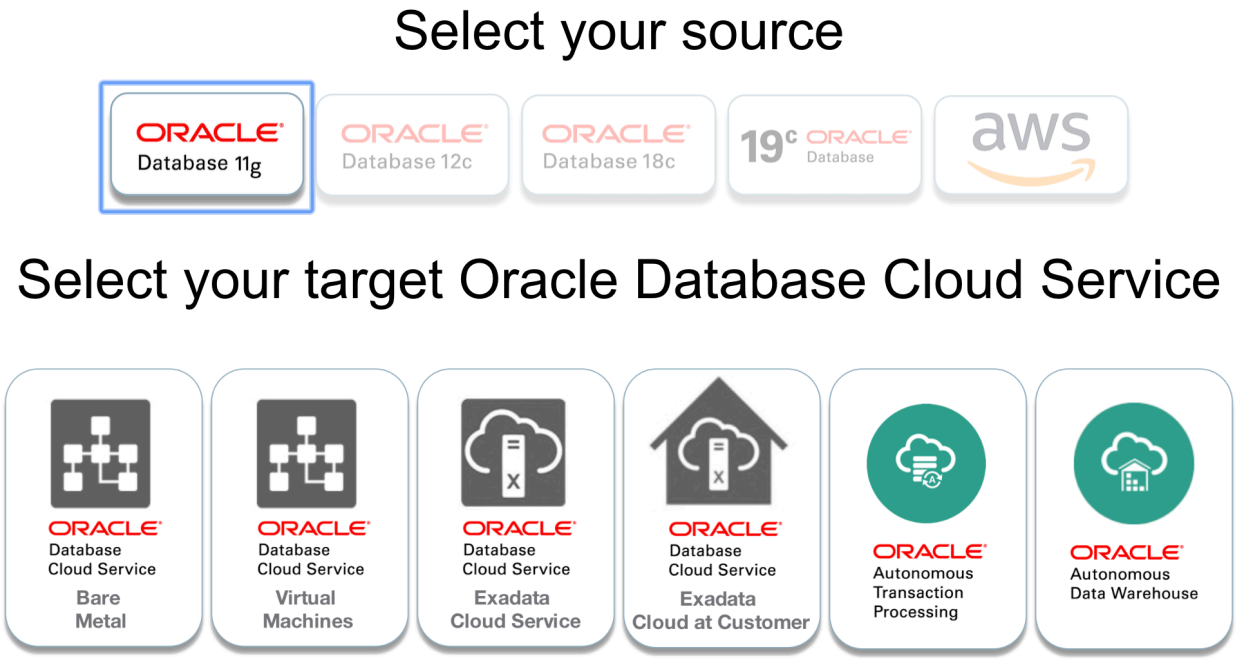
ORACLE DATABASE CLOUD SERVICE
CLOUD DATABASE

In this presentation, I'm assuming you already have the Database created in the Oracle Cloud.

Copyright © 2018 Accenture. All rights reserved.

ORACLE DATABASE CLOUD SERVICE
CLOUD DATABASE

https://www.oracle.com/goto/move



Copyright © 2018 Accenture. All rights reserved.

ORACLE DATABASE CLOUD
SOME MIGRATION METHODS

Migration Methods

Many methods exist to migrate Oracle databases to the Oracle Cloud Infrastructure Database service. Which of these methods apply to a given migration scenario depends on several factors, including the version, character set, and platform endian format of the source and target databases.

- Data Pump Conventional Export/Import
- Data Pump Full Transportable
- Data Pump Transportable Tablespace
- Remote Cloning a PDB
- Remote Cloning Non-CDB
- RMAN Cross-Platform Transportable PDB
- RMAN Cross-Platform Transportable Tablespace Backup Sets
- RMAN Transportable Tablespace with Data Pump
- RMAN DUPLICATE from an Active Database
- RMAN CONVERT Transportable Tablespace with Data Pump
- SQL Developer and INSERT Statements to Migrate Selected Objects
- SQL Developer and SQL*Loader to Migrate Selected Objects
- Unplugging/Plugging a PDB
- Unplugging/Plugging Non-CDB

https://docs.cloud.oracle.com/iaas/Content/Database/Tasks/migrating.htm

Copyright © 2018 Accenture. All rights reserved.

ORACLE DATABASE CLOUD
MIGRATING FROM NON-CDB TO CDB

- https://mikedietrichde.com/2019/07/22/database-migration-from-non-cdb-to-pdb-overview/
- https://mikedietrichde.com/2019/07/23/database-migration-from-non-cdb-to-pdb-upgrade-plug-in-convert/
- https://mikedietrichde.com/2019/07/24/database-migration-from-non-cdb-to-pdb-plug-in-upgrade-convert/
- https://mikedietrichde.com/2019/07/25/database-migration-from-non-cdb-to-pdb-clone-via-noncdb-upgrade-convert/
- https://mikedietrichde.com/2019/07/29/database-migration-from-non-cdb-to-pdb-typical-plugin-issues-and-workarounds/
- https://mikedietrichde.com/2019/07/29/database-migration-from-non-cdb-to-pdb-the-compatible-pitfall/
- https://mikedietrichde.com/2019/07/30/database-migration-from-non-cdb-to-pdb-the-time-zone-pitfall/
- https://mikedietrichde.com/2019/07/31/database-migration-from-non-cdb-to-pdb-the-component-pitfall/
- https://mikedietrichde.com/2019/08/01/database-migration-from-non-cdb-to-pdb-the-patch-level-pitfall/
- https://mikedietrichde.com/2019/08/02/database-migration-from-non-cdb-to-pdb-various-pitfalls/
- https://mikedietrichde.com/2019/08/05/database-migration-from-non-cdb-to-pdb-the-fallback-challenge/
- https://mikedietrichde.com/2019/08/13/database-migration-from-non-cdb-to-pdb-the-minimal-downtime-challenge/
- https://mikedietrichde.com/2019/08/14/database-migration-from-non-cdb-to-pdb-migration-with-data-pump/

Copyright © 2018 Accenture. All rights reserved.

ORACLE DATABASE CLOUD
CHOOSING A MIGRATION METHOD

- On-premises Database Version → Cloud Database Version
- On-premises Host Operating System
- Database Size
- Network Bandwidth
- **Downtime**

https://docs.oracle.com/en/cloud/paas/database-dbaas-cloud/csdbi/considerations-migrating-premises-database-dbcs.html

Copyright © 2018 Accenture. All rights reserved.

ORACLE DATABASE CLOUD
MIGRATING FROM ORACLE DATABASE 11G TO ORACLE DATABASE 11G IN THE CLOUD

- Data Pump Conventional Export/Import
- Data Pump Transportable Tablespace
- RMAN Transportable Tablespace with Data Pump
- RMAN CONVERT Transportable Tablespace with Data Pump

Copyright © 2018 Accenture. All rights reserved.

ORACLE DATABASE CLOUD
MIGRATING FROM ORACLE DATABASE 11G TO ORACLE DATABASE 12C/18C/19C IN THE CLOUD

- Data Pump Conventional Export/Import
- Data Pump Transportable Tablespace
- RMAN Transportable Tablespace with Data Pump
- RMAN CONVERT Transportable Tablespace with Data Pump
- Data Pump Full Transportable

Copyright © 2018 Accenture. All rights reserved.

ORACLE DATABASE CLOUD
MIGRATING FROM ORACLE DATABASE 12C/18C/19C CDB TO ORACLE DATABASE 12C/18C/19C IN THE CLOUD

- Data Pump Conventional Export/Import
- Data Pump Transportable Tablespace
- RMAN Transportable Tablespace with Data Pump
- RMAN CONVERT Transportable Tablespace with Data Pump
- RMAN Cross-Platform Transportable Tablespace Backup Sets
- Data Pump Full Transportable
- Unplugging/Plugging (CDB)
- Remote Cloning (CDB)
- RMAN Cross-Platform Transportable PDB
- SQL Developer and SQL*Loader to Migrate Selected Objects
- SQL Developer and INSERT Statements to Migrate Selected Objects

Copyright © 2018 Accenture. All rights reserved.

ORACLE DATABASE CLOUD
MIGRATING FROM ORACLE DATABASE 12C/18C/19C NON-CDB TO ORACLE DATABASE 12C/18C/19C IN THE CLOUD

- Data Pump Conventional Export/Import
- Data Pump Transportable Tablespace
- RMAN Transportable Tablespace with Data Pump
- RMAN CONVERT Transportable Tablespace with Data Pump
- RMAN Cross-Platform Transportable Tablespace Backup Sets
- Data Pump Full Transportable
- Unplugging/Plugging (CDB)
- Remote Cloning (non-CDB)
- SQL Developer and SQL*Loader to Migrate Selected Objects
- SQL Developer and INSERT Statements to Migrate Selected Objects

Copyright © 2018 Accenture. All rights reserved.

ORACLE DATABASE CLOUD
CHOOSING A MIGRATION METHOD

Downtime?

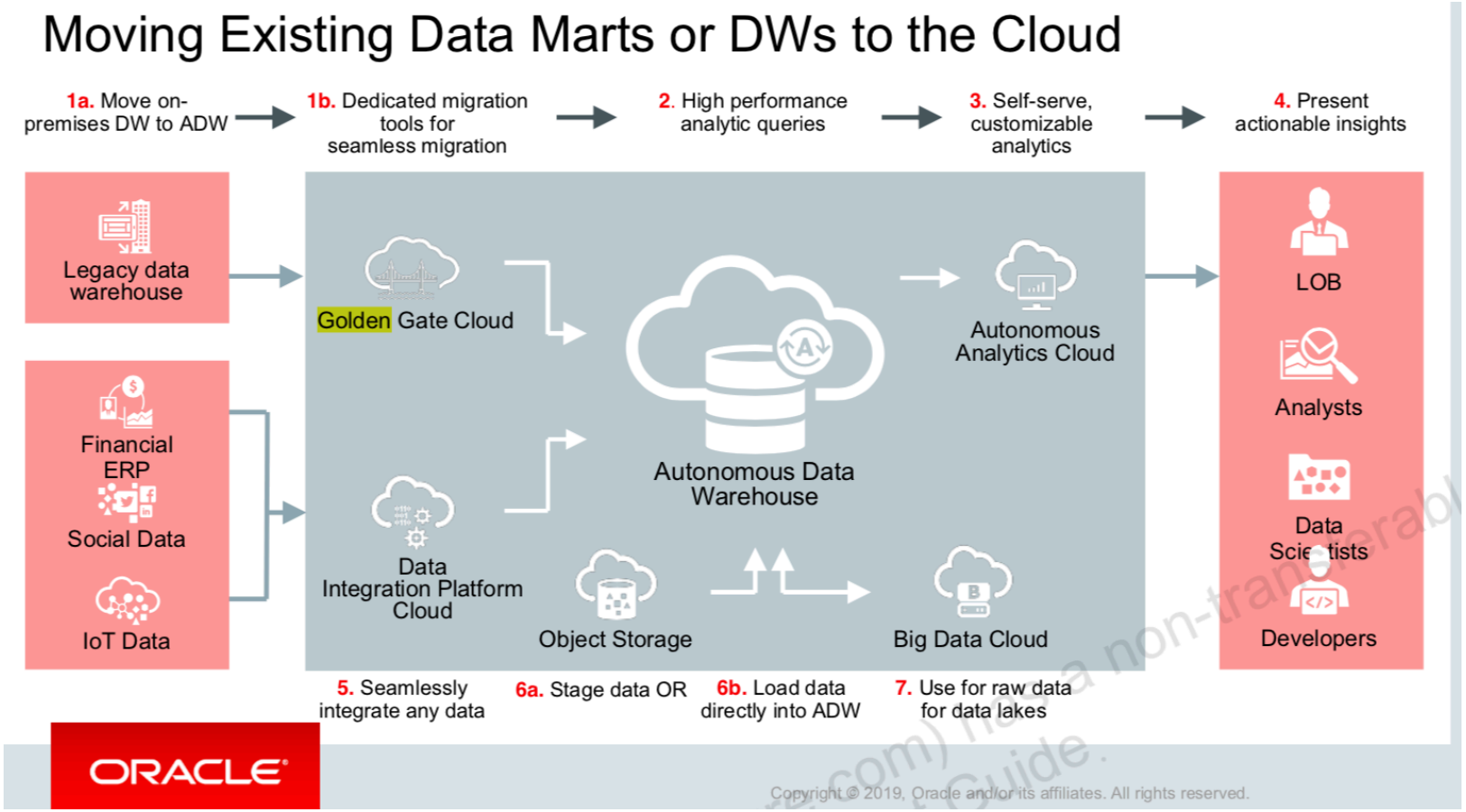
Copyright © 2018 Accenture. All rights reserved.

LOAD DATA

Uploading data to the cloud, even using fast public internet connections, migrating **100 TB** of data can take up to **8 months**.

Copyright © 2018 Accenture. All rights reserved.

LOAD DATA
AUTONOMOUS DATABASE



- SQLDeveloper
- Data Pump
- Golden Gate

- ~~RMAN~~
- ~~Unplug/Plug~~
- ~~TTS~~

Copyright © 2018 Accenture. All rights reserved.

LOAD DATA
DATA TRANSFER SERVICE

- Fast Data Migration → Move 100s of TB of data to Oracle Cloud Infrastructure in days, instead of weeks or months.
- Simple → Use the UI or the Data Transfer Utility to initiate the data migration process, **copy data to hard drives**, and **ship them to Oracle**, where we **import it**.
- Scalable → Whether you want to migrate a few **terabytes** or a **petabyte**, Data Transfer Service can help.
- Affordable → There is no cost to transfer data with Data Transfer Service.

https://cloud.oracle.com/storage/data-transfer/features

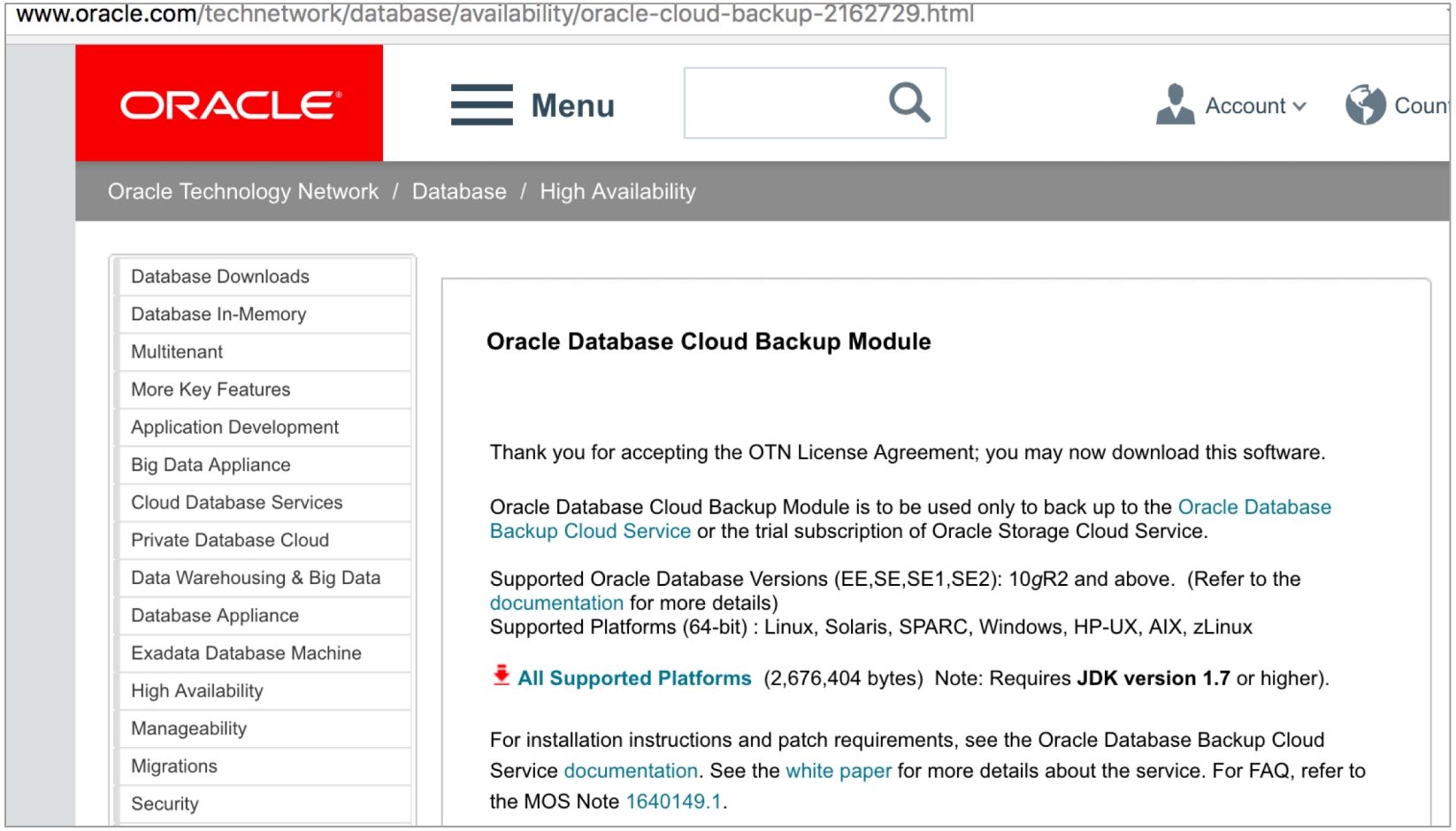
Copyright © 2018 Accenture. All rights reserved.

LOAD DATA
DATA TRANSFER APPLIANCE

https://blogs.oracle.com/cloud-infrastructure/introducing-oracle-cloud-infrastructure-data-transfer-appliance

Copyright © 2018 Accenture. All rights reserved.

LOAD DATA / MIGRATION – BACKUP / RESTORE
ORACLE DATABASE CLOUD BACKUP MODULE



Copyright © 2018 Accenture. All rights reserved.

LOAD DATA / MIGRATION – BACKUP / RESTORE
ORACLE DATABASE CLOUD BACKUP MODULE

- Download the Oracle Database Cloud Backup Module, and upload it to the source and target database instances.

- Log in as the **oracle** user, go to the directory, unzip **opc_installer.zip**, and run **java -jar oci_install.jar** to install the backup module.

https://www.oracle.com/technetwork/pt/articles/cloudcomp/migra%C3%A7ao-dbs-a-oci-p1-5462577-ptb.html

Copyright © 2018 Accenture. All rights reserved.

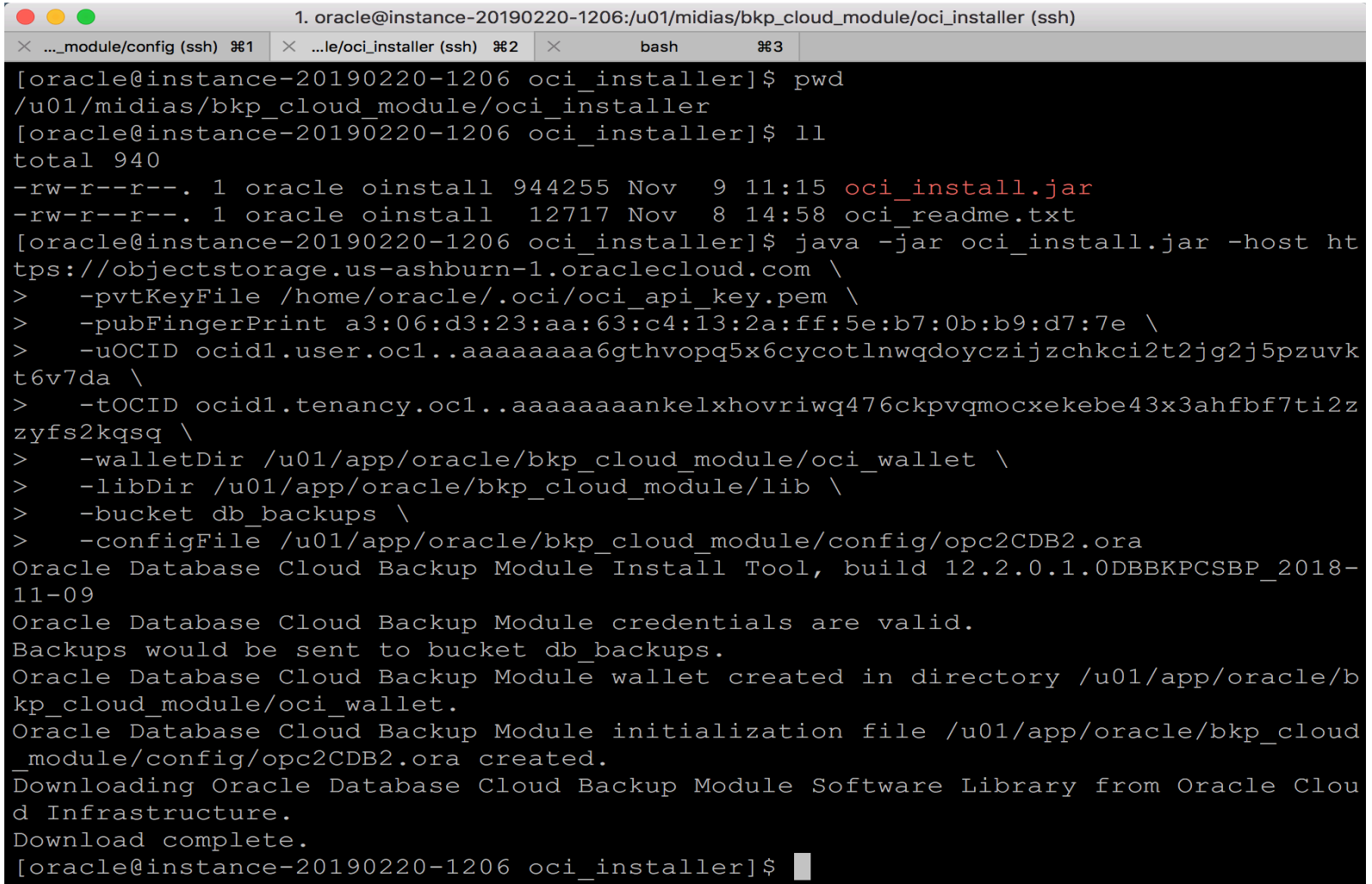
LOAD DATA / MIGRATION – BACKUP / RESTORE
ORACLE DATABASE CLOUD BACKUP MODULE

Database Server in the Oracle Cloud

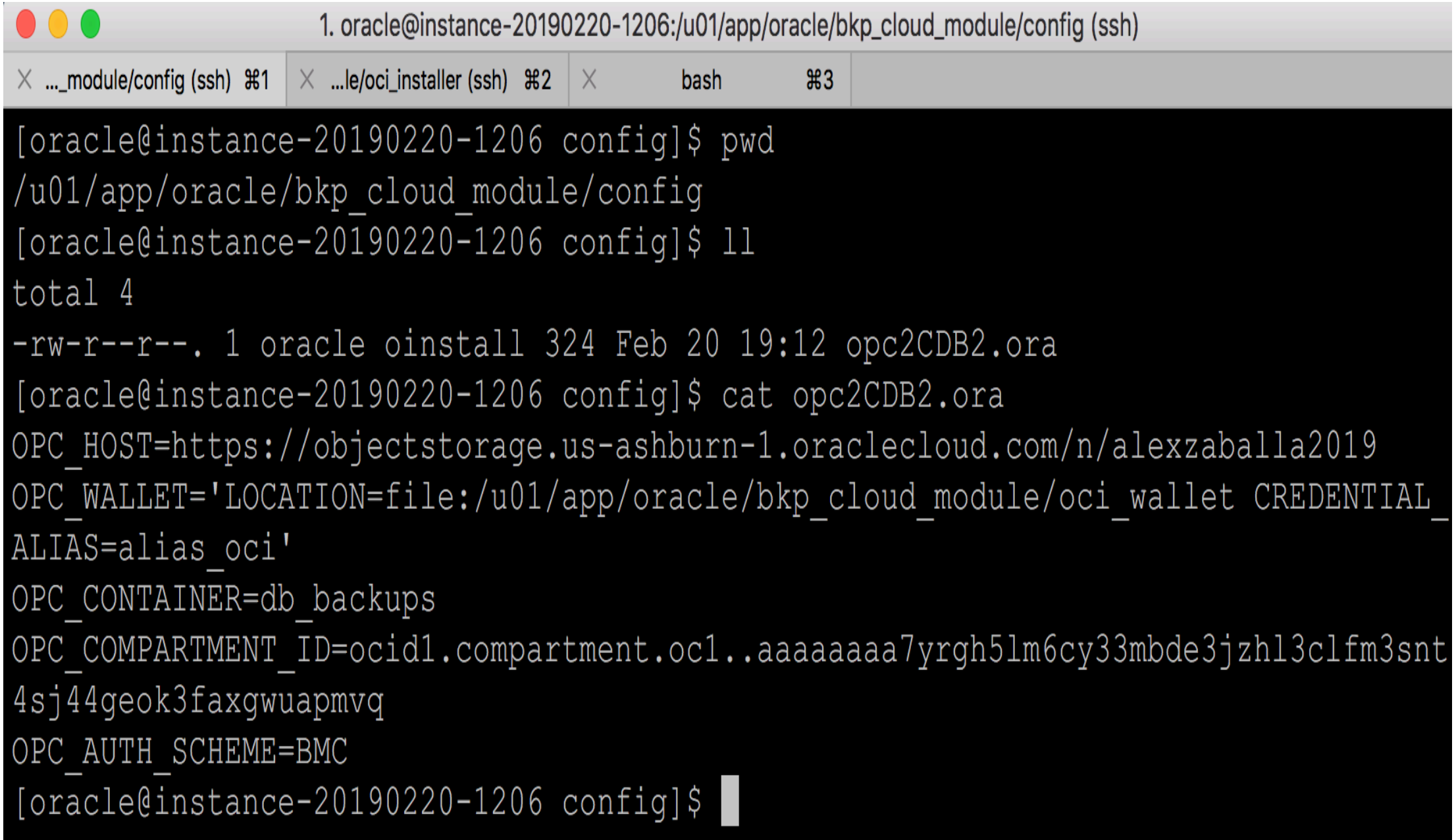
Copyright © 2018 Accenture. All rights reserved.

LOAD DATA / MIGRATION – BACKUP / RESTORE

java -jar oci_install.jar **-host** https://objectstorage.us-phoenix-1.oraclecloud.com **-pvtKeyFile** oci_private_key **-pubFingerPrint** oci_public_fingerprint **-uOCID** user_ocid **-tOCID** tenancy_ocid **-walletDir** /wallet_directory **-libDir** /library_directory



LOAD DATA / MIGRATION – BACKUP / RESTORE



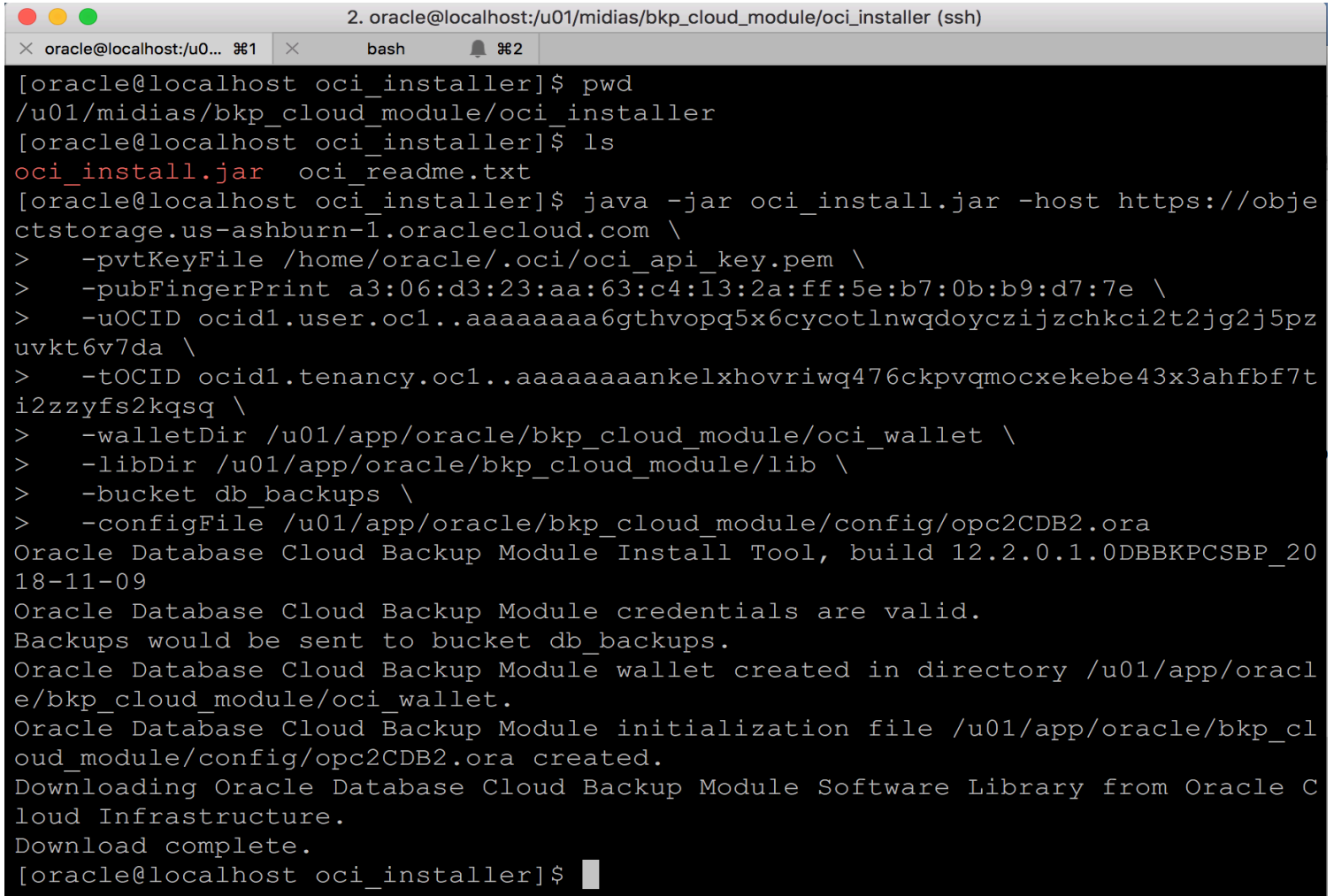
LOAD DATA / MIGRATION – BACKUP / RESTORE
ORACLE DATABASE CLOUD BACKUP MODULE

Database Server on-premises

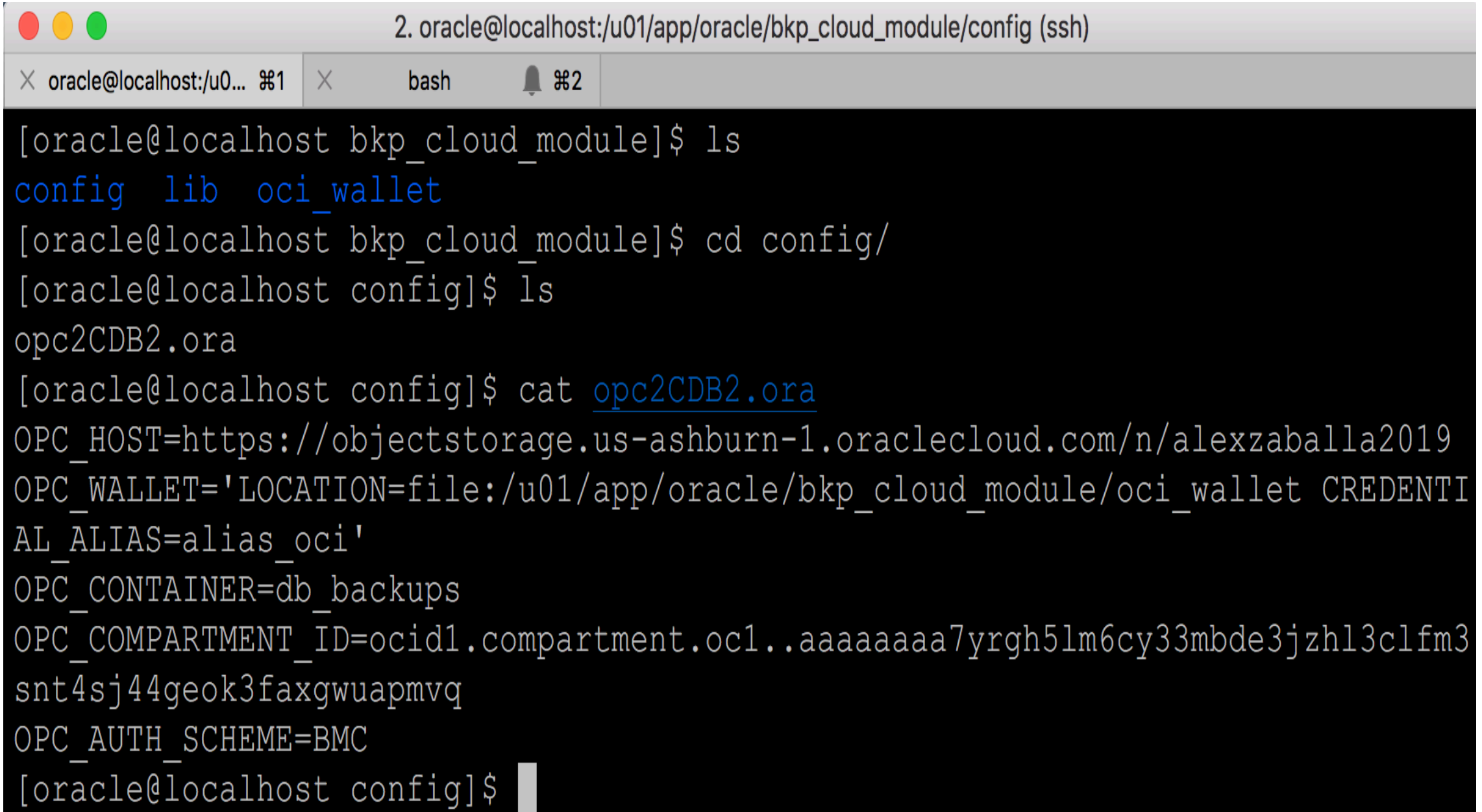
Copyright © 2018 Accenture. All rights reserved.

LOAD DATA / MIGRATION – BACKUP / RESTORE

java -jar oci_install.jar **-host** https://objectstorage.us-phoenix-1.oraclecloud.com **-pvtKeyFile** oci_private_key **-pubFingerPrint** oci_public_fingerprint **-uOCID** user_ocid **-tOCID** tenancy_ocid **-walletDir** /wallet_directory **-libDir** /library_directory

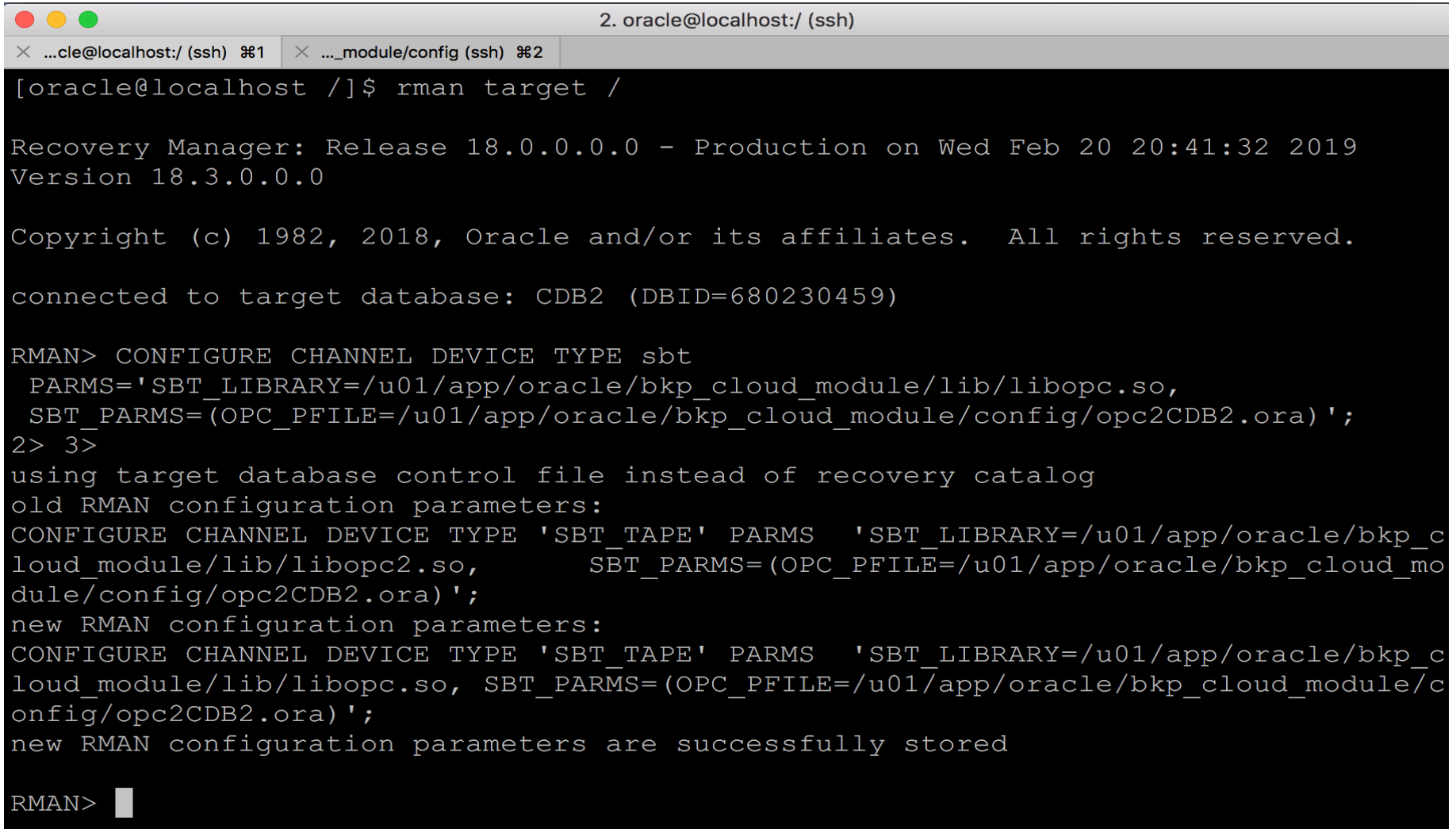


LOAD DATA / MIGRATION – BACKUP / RESTORE

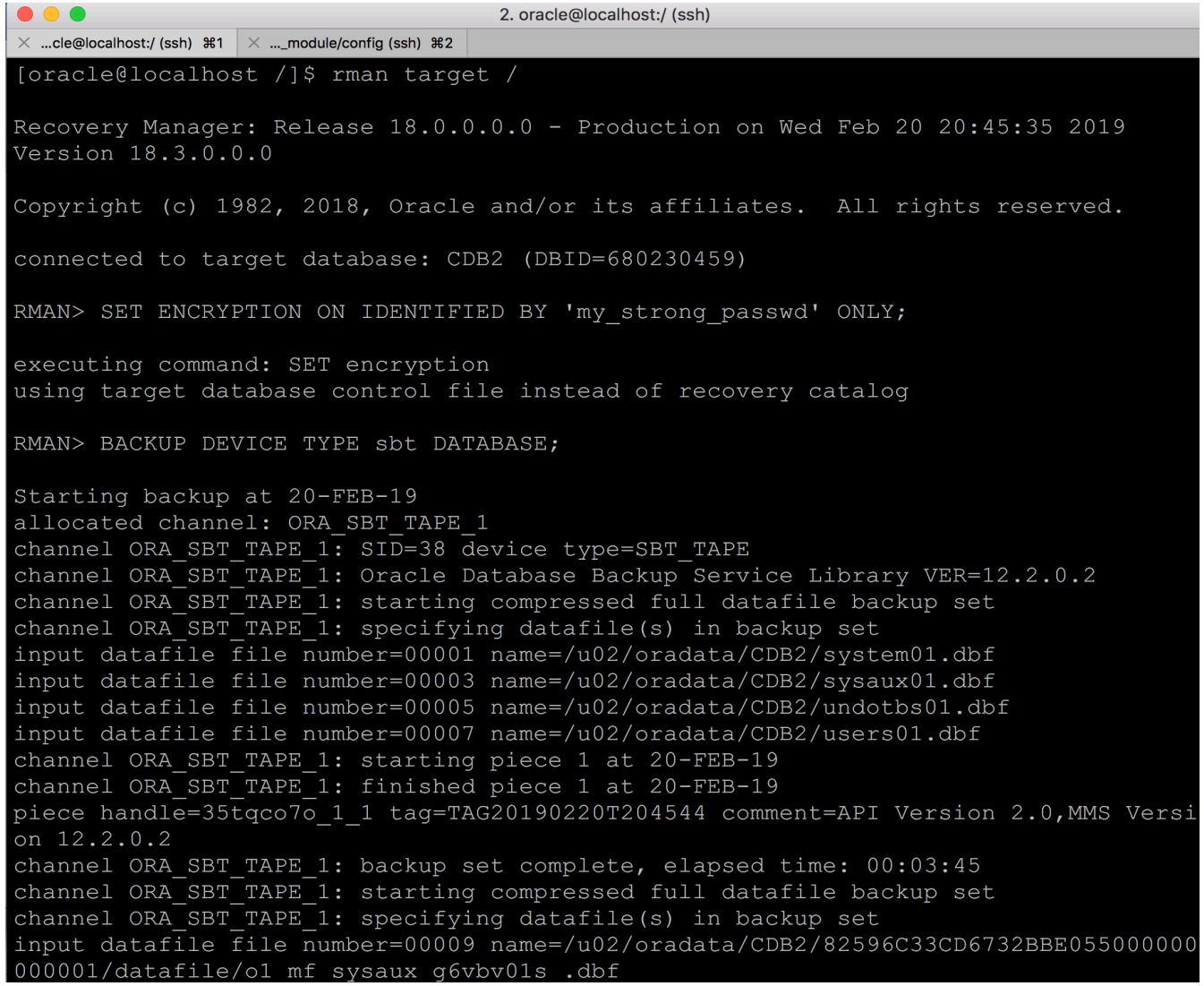


LOAD DATA / MIGRATION – BACKUP / RESTORE

CONFIGURE CHANNEL DEVICE TYPE sbt
PARMS='**SBT_LIBRARY**=location-of-the-SBT-library-OCI-Backup-Module-for-OCI,
SBT_PARMS=(**OPC_PFILE**=location-of-the-configuration file)';



LOAD DATA / MIGRATION – BACKUP / RESTORE
ORACLE DATABASE CLOUD BACKUP MODULE



SET ENCRYPTION ON IDENTIFIED BY 'my_passwd';

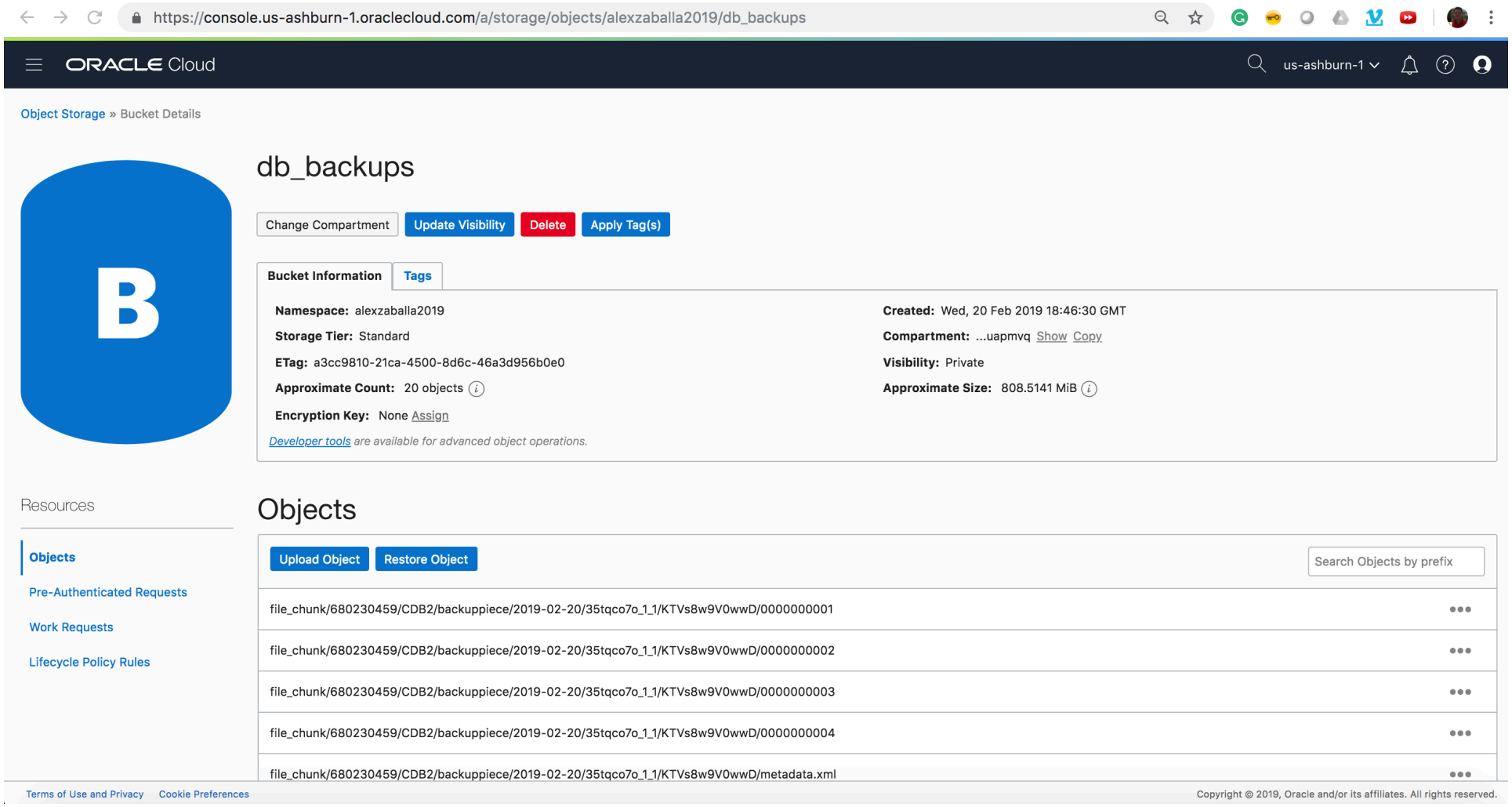
BACKUP DEVICE TYPE SBT DATABASE;

backup as compressed backupset DEVICE TYPE sbt incremental level 0 database plus archivelog;

backup as compressed backupset DEVICE TYPE sbt incremental level 1 database plus archivelog;

Copyright © 2018 Accenture. All rights reserved.

LOAD DATA / MIGRATION – BACKUP / RESTORE
ORACLE DATABASE CLOUD BACKUP MODULE



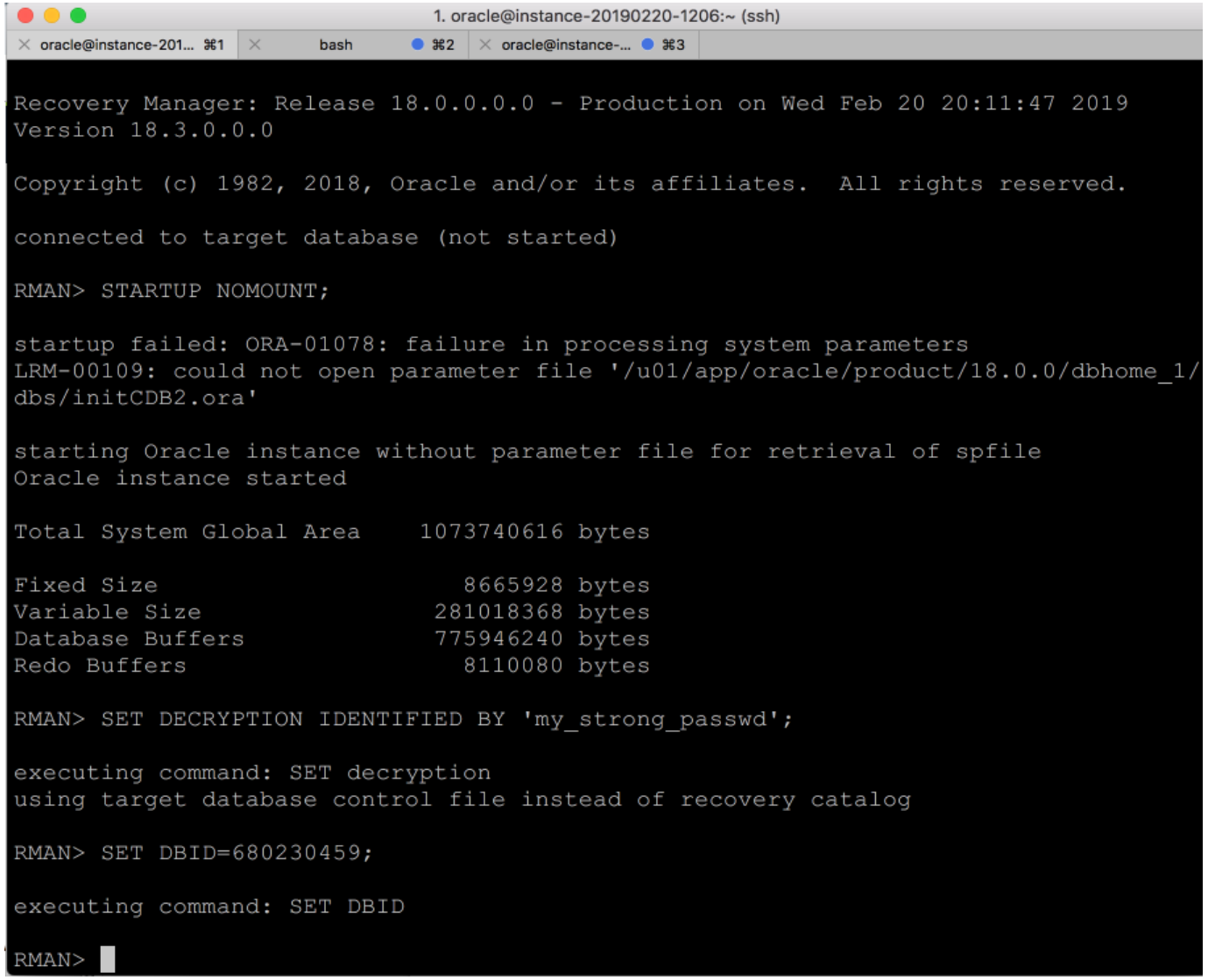
Copyright © 2018 Accenture. All rights reserved.

LOAD DATA / MIGRATION – BACKUP / RESTORE
ORACLE DATABASE CLOUD BACKUP MODULE

Database Server in the Oracle Cloud

Copyright © 2018 Accenture. All rights reserved.

LOAD DATA / MIGRATION – BACKUP / RESTORE
ORACLE DATABASE CLOUD BACKUP MODULE



STARTUP NOMOUNT;

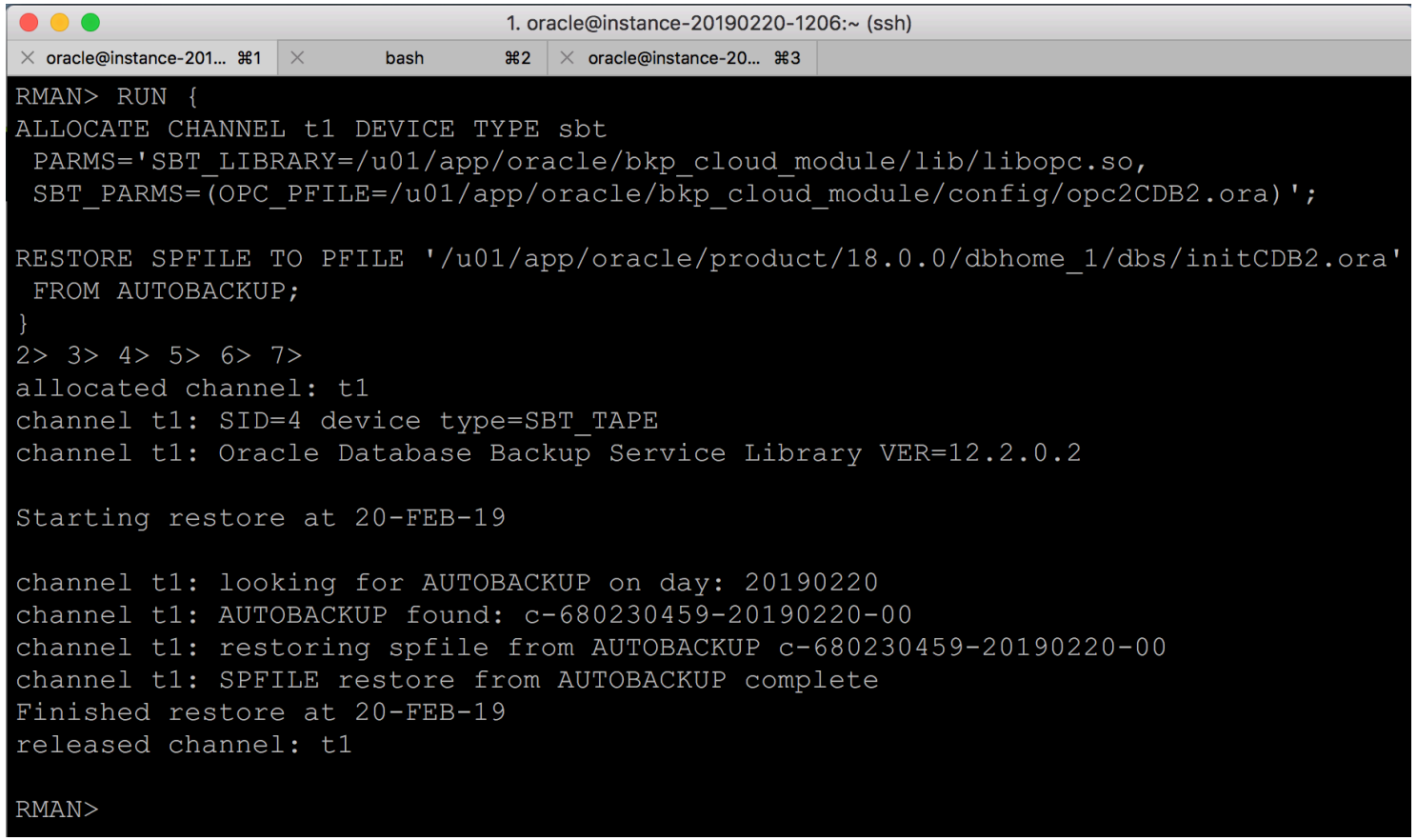
SET DECRYPTION ON IDENTIFIED BY 'my_passwd';

SET DBID = your_source_db_id;

Copyright © 2018 Accenture. All rights reserved.

LOAD DATA / MIGRATION – BACKUP / RESTORE
ORACLE DATABASE CLOUD BACKUP MODULE

Restore the Server Parameter File:



RESTORE SPFILE TO
PFILE '$ORACLE_HOME/dbs/initCDB2.ora'
FROM AUTOBACKUP;

Copyright © 2018 Accenture. All rights reserved.

LOAD DATA / MIGRATION – BACKUP / RESTORE
ORACLE DATABASE CLOUD BACKUP MODULE

Restore the Database Control Files:

```
RMAN> RUN {
ALLOCATE CHANNEL t1 DEVICE TYPE sbt
 PARMS='SBT_LIBRARY=/u01/app/oracle/bkp_cloud_module/lib/libopc.so,
 SBT_PARMS=(OPC_PFILE=/u01/app/oracle/bkp_cloud_module/config/opc2CDB2.ora)';

RESTORE CONTROLFILE FROM AUTOBACKUP;
}2> 3> 4> 5> 6> 7>

allocated channel: t1
channel t1: SID=20 device type=SBT_TAPE
channel t1: Oracle Database Backup Service Library VER=12.2.0.2

Starting restore at 20-FEB-19

channel t1: looking for AUTOBACKUP on day: 20190220
channel t1: AUTOBACKUP found: c-680230459-20190220-00
channel t1: restoring control file from AUTOBACKUP c-680230459-20190220-00
channel t1: control file restore from AUTOBACKUP complete
output file name=/u02/oradata/CDB2/control01.ctl
output file name=/u02/oradata/CDB2/control02.ctl
Finished restore at 20-FEB-19
released channel: t1

RMAN> ALTER DATABASE MOUNT;

Statement processed

RMAN>
```

RESTORE CONTROLFILE FROM AUTOBACKUP;

ALTER DATABASE MOUNT;

Copyright © 2018 Accenture. All rights reserved.

LOAD DATA / MIGRATION – BACKUP / RESTORE
ORACLE DATABASE CLOUD BACKUP MODULE

Restore/Recover the Database Files:

```
RMAN> RESTORE DATABASE;

Starting restore at 20-FEB-19
Starting implicit crosscheck backup at 20-FEB-19
allocated channel: ORA_DISK_1
channel ORA_DISK_1: SID=23 device type=DISK
Finished implicit crosscheck backup at 20-FEB-19

Starting implicit crosscheck copy at 20-FEB-19
using channel ORA_DISK_1
Finished implicit crosscheck copy at 20-FEB-19

searching for all files in the recovery area
cataloging files...
no files cataloged

allocated channel: ORA_SBT_TAPE_1
channel ORA_SBT_TAPE_1: SID=24 device type=SBT_TAPE
channel ORA_SBT_TAPE_1: Oracle Database Backup Service Library VER=12.2.0.2
using channel ORA_DISK_1

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 /u02/oradata/CDB2/system01.dbf
channel ORA_SBT_TAPE_1: restoring datafile 00003 to /u02/oradata/CDB2/sysaux01.dbf
channel ORA_SBT_TAPE_1: restoring datafile 00005 to /u02/oradata/CDB2/undotbs01.db
f
channel ORA_SBT_TAPE_1: restoring datafile 00007 to /u02/oradata/CDB2/users01.dbf
channel ORA_SBT_TAPE_1: reading from backup piece 35tqco7o_1_1
```

RESTORE DATABASE;

Copyright © 2018 Accenture. All rights reserved.

LOAD DATA / MIGRATION – BACKUP / RESTORE
ORACLE DATABASE CLOUD BACKUP MODULE

Restore/Recover the Database Files:

```
RMAN> RECOVER DATABASE UNTIL SCN 3325612;

Starting recover at 20-FEB-19
using channel ORA_SBT_TAPE_1
allocated channel: ORA_DISK_1
channel ORA_DISK_1: SID=24 device type=DISK

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

Finished recover at 20-FEB-19

RMAN>
```

RECOVER DATABASE options;

UNTIL SCN
UNTIL CANCEL
UNTIL AVAILABLE REDO

```
RMAN> ALTER DATABASE OPEN RESETLOGS;

Statement processed
```

ALTER DATABASE OPEN NORESETLOGS;

Copyright © 2018 Accenture. All rights reserved.

LOAD DATA / MIGRATION – BACKUP / RESTORE
ORACLE DATABASE CLOUD BACKUP MODULE

- No upgrade to new version
- Source version 11.2.0.4, 12.1.0.2, 12.2.0.1, 18 e 19

Copyright © 2018 Accenture. All rights reserved.

MIGRATING AN ON-PREMISES DATABASE TO ORACLE CLOUD INFRASTRUCTURE

CREATE A BACKUP IN THE CLOUD

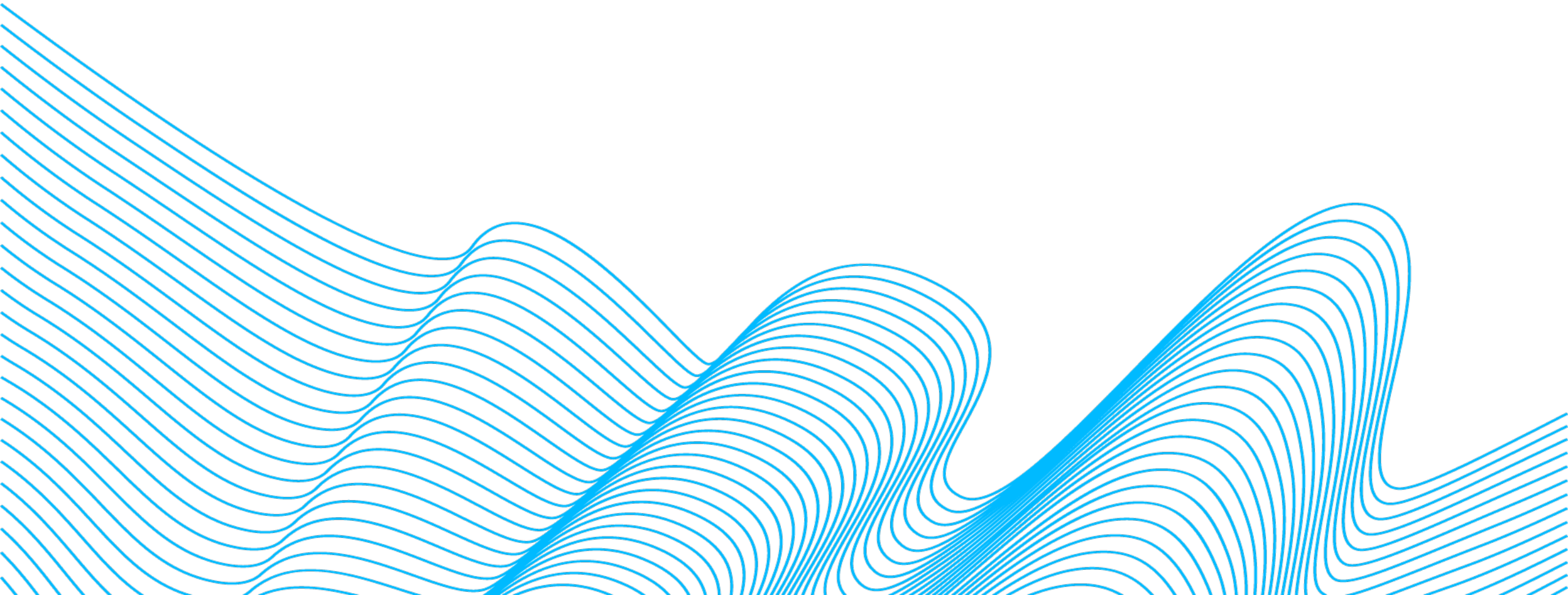
https://blogs.oracle.com/dbcs/create-a-backup-in-the-cloud

“In this blog, we are going to go over just that, a method to move your database into the Oracle's cloud with a single command.”

“We can use the Database Backup Cloud Service to take a full backup of a selected database then create a database in OCI from that backup.”

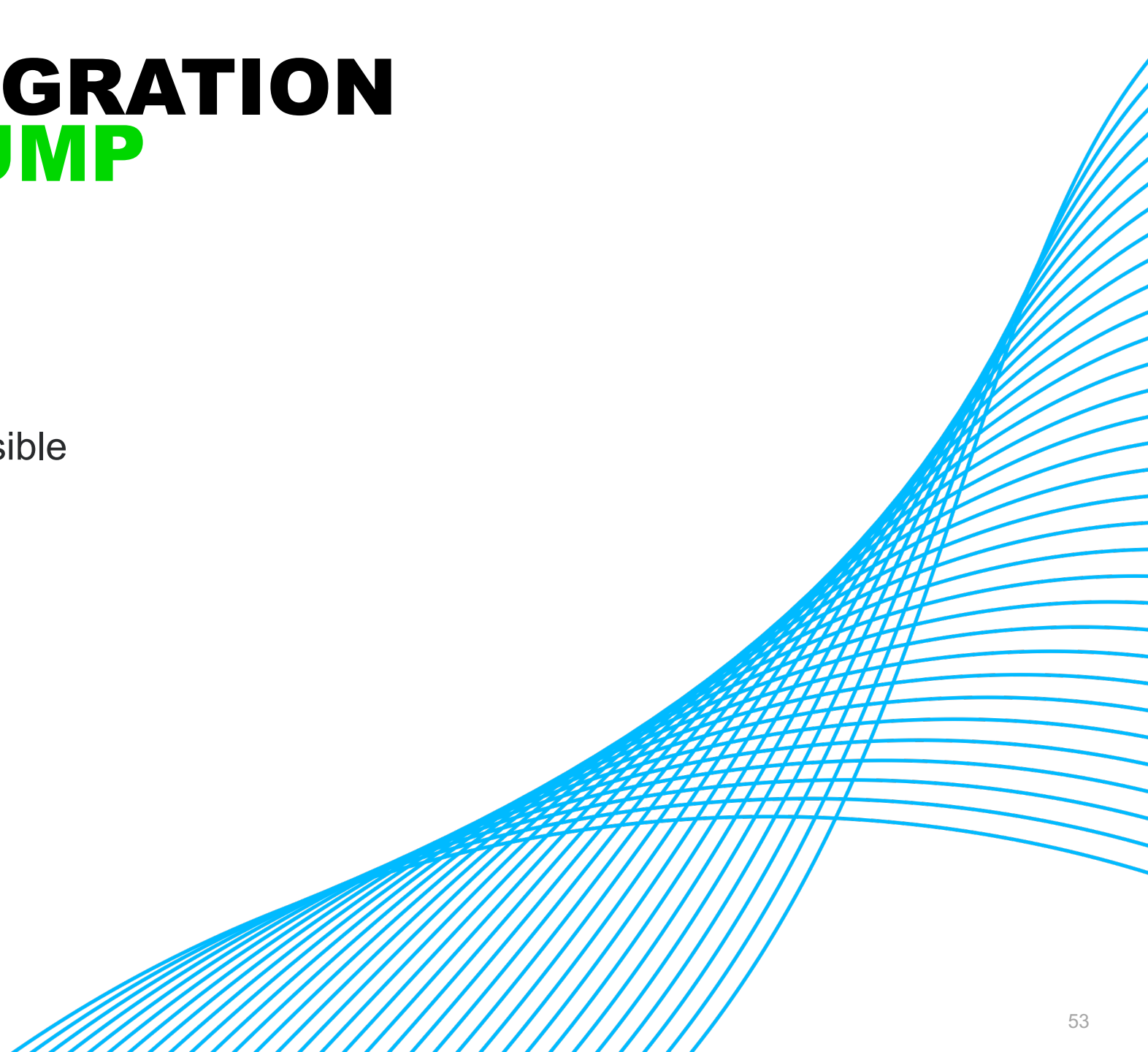
Copyright © 2018 Accenture. All rights reserved.

LOAD DATA / MIGRATION
USING DATA PUMP



LOAD DATA / MIGRATION
USING DATA PUMP

- Cross-endian possible
- Source version 10g and later
- Migrate from non-CDB to PDB
- Changes to database structure possible
- Upgrade to new version possible



Copyright © 2018 Accenture. All rights reserved.

ORACLE DATABASE CLOUD
DATA PUMP

On-premises host:

mkdir /u01/app/oracle/admin/orcl/dpdump/for_cloud

sqlplus user/password

CREATE DIRECTORY dp_for_cloud AS
'/u01/app/oracle/admin/orcl/dpdump/for_cloud';

expdp user/password SCHEMAS=fsowner DIRECTORY=dp_for_cloud

Copyright © 2018 Accenture. All rights reserved.

ORACLE DATABASE CLOUD
DATA PUMP

Database Cloud Service compute node:
mkdir /u01/app/oracle/admin/ORCL/dpdump/from_onprem

On-premises host:
scp –i private_key_file \
/u01/app/oracle/admin/orcl/dpdump/for_cloud/expdat.dmp\
oracle@IP_address_DBaaS_VM:/u01/app/oracle/admin/ORCL/dpdump/from_onprem

Database Cloud Service compute node:
sqlplus user/password

CREATE DIRECTORY dp_from_onprem AS '/u01/app/oracle/admin/ORCL/dpdump/from_onprem';

impdp user/password SCHEMAS=fsowner DIRECTORY=dp_from_onprem

Copyright © 2018 Accenture. All rights reserved.

ORACLE DATABASE CLOUD
DATA PUMP

Options to consider:

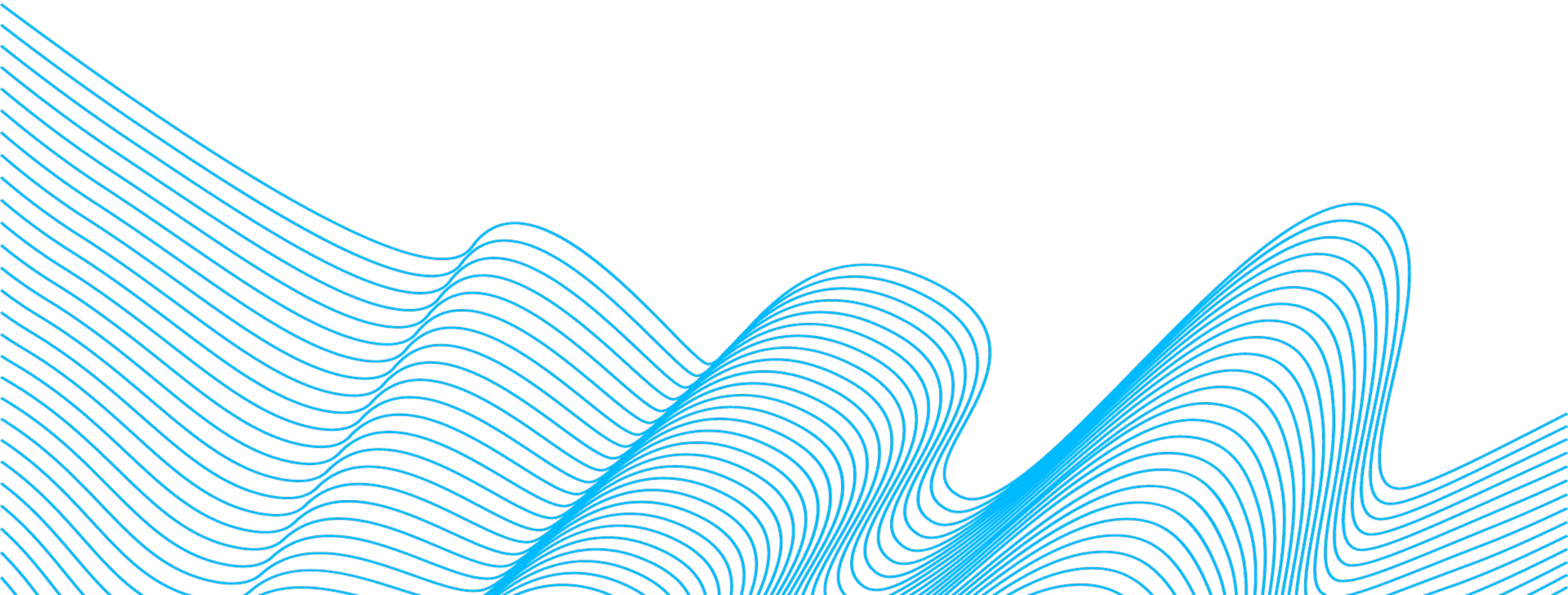
- Database Link
- Object Storage

impdp admin/*password*@ADWC1_high \
 directory=data_pump_dir \
 credential=def_cred_name \
 dumpfile= **https://swiftobjectstorage.us-phoenix-1.oraclecloud.com/v1/adwc/adwc_user/export%u.dmp**

https://docs.oracle.com/en/cloud/paas/autonomous-data-warehouse-cloud/user/load-data.html#GUID-297FE3E6-A823-4F98-AD50-959ED96E6969

Copyright © 2018 Accenture. All rights reserved.

LOAD DATA / MIGRATION
TRANSPORTABLE TABLESPACES



LOAD DATA / MIGRATION
USING TRANSPORTABLE TABLESPACES

- Cross-endian possible
- Source version 8i and later (sameOS) or 10g and later cross-endian
- Migrate from non-CDB to PDB
- Upgrade to new version possible

Copyright © 2018 Accenture. All rights reserved.

ORACLE DATABASE CLOUD
TRANSPORTABLE TABLESPACE

On-premises host:

mkdir /u01/app/oracle/admin/orcl/dpdump/for_cloud

sqlplus user/password

CREATE DIRECTORY dp_for_cloud AS '/u01/app/oracle/admin/orcl/dpdump/for_cloud';

ALTER TABLESPACE fsindex READ ONLY;
ALTER TABLESPACE fsdata READ ONLY;

expdp user/password TRANSPORT_TABLESPACES=fsdata,fsindex
TRANSPORT_FULL_CHECK=YES DIRECTORY=dp_for_cloud

Copyright © 2018 Accenture. All rights reserved.

ORACLE DATABASE CLOUD
TRANSPORTABLE TABLESPACE

Database Cloud Service compute node:

mkdir /u01/app/oracle/admin/ORCL/dpdump/from_onprem

On-premises host:
$ scp -i *private_key_file* \ /u01/app/oracle/admin/orcl/dpdump/for_cloud/expdat.dmp \
oracle@*IP_address_DBaaS_VM*:/u01/app/oracle/admin/ORCL/dpdump/from_onprem

$ scp -i *private_key_file* \ /u01/app/oracle/oradata/orcl/fsdata01.dbf \
oracle@IP_address_DBaaS_VM:/u02/app/oracle/oradata/ORCL

$ scp -i *private_key_file* \ /u01/app/oracle/oradata/orcl/fsindex01.dbf \
oracle@IP_address_DBaaS_VM:/u02/app/oracle/oradata/ORCL

ALTER TABLESPACE fsdata READ WRITE;
ALTER TABLESPACE fsindexREAD WRITE;

Copyright © 2018 Accenture. All rights reserved.

ORACLE DATABASE CLOUD
TRANSPORTABLE TABLESPACE

Database Cloud Service compute node:

CREATE DIRECTORY dp_from_onprem AS '/u01/app/oracle/admin/ORCL/dpdump/from_onprem';

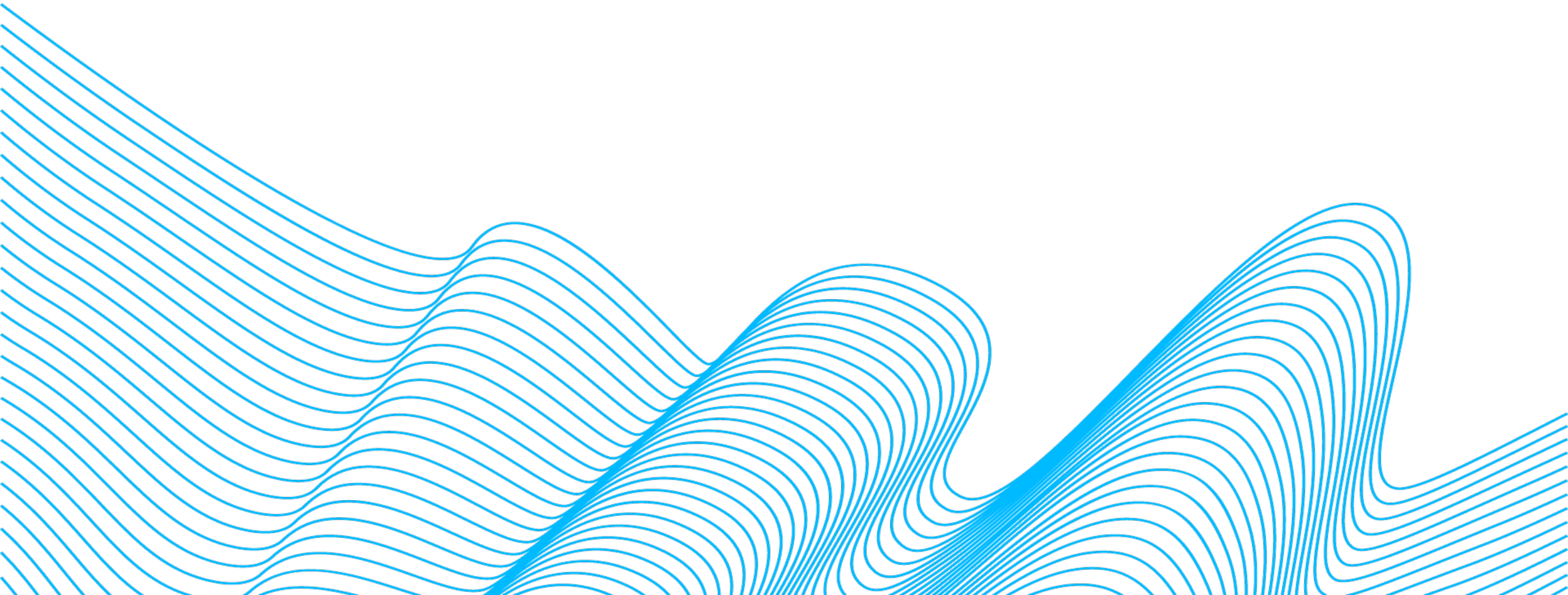
SQL> CREATE USER fsowner PROFILE default IDENTIFIED BY fspass TEMPORARY TABLESPACE temp ACCOUNT UNLOCK;

impdp user/password DIRECTORY=dp_from_onprem \
TRANSPORT_DATAFILES='/u02/app/oracle/oradata/ORCL/fsdata01.dbf', \
'/u02/app/oracle/oradata/ORCL/fsindex01.dbf'

ALTER TABLESPACE fsdata READ WRITE;
ALTER TABLESPACE fsindex READ WRITE;

Copyright © 2018 Accenture. All rights reserved.

LOAD DATA / MIGRATION
USING DATA GUARD



LOAD DATA / MIGRATION
USING DATA GUARD

- No cross-endian
- No upgrade to new version
- **Minimal downtime migration**
- Source version 11.2.0.4, 12.1.0.2, 12.2.0.1, 18, 19

Copyright © 2018 Accenture. All rights reserved.

LOAD DATA / MIGRATION
USING DATA GUARD

This migration can be done in two different ways:

- Using Oracle Database Cloud Services (DBaaS)
- Using Oracle Compute (IaaS).

Copyright © 2018 Accenture. All rights reserved.

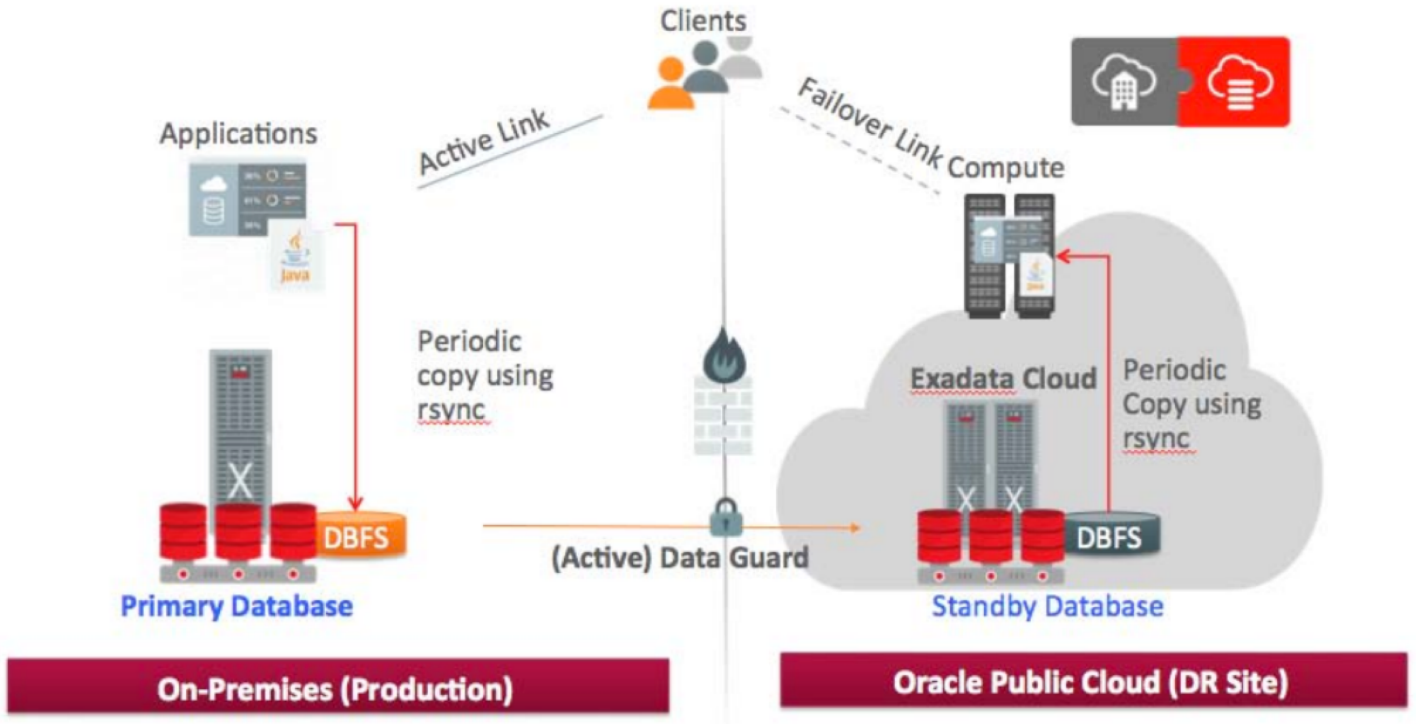
ORACLE DATABASE CLOUD
DATA GUARD

1. Create Physical Standby
2. Prepare Client Connections (Ex: tnsnames.ora)
3. Switchover to Physical Standby

Disaster Recovery to the Oracle Cloud
http://www.oracle.com/technetwork/database/availability/dr-to-oracle-cloud-2615770.pdf

Copyright © 2018 Accenture. All rights reserved.

ORACLE DATABASE CLOUD
DATA GUARD



Copyright © 2018 Accenture. All rights reserved.

ORACLE DATABASE CLOUD
DATA GUARD

On-premises host:

SELECT log_mode FROM v$database;
LOG_MODE

NOARCHIVELOG

SHUTDOWN IMMEDIATE;
STARTUP MOUNT;
ALTER DATABASE ARCHIVELOG;
ALTER DATABASE OPEN;

ALTER DATABASE FORCE LOGGING;

Copyright © 2018 Accenture. All rights reserved.

ORACLE DATABASE CLOUD
DATA GUARD

On-premises host:

- Create standby redo logs **on the primary database** initially (recommended).
- Create standby redo logs using the **same file size as the primary database** online redo logs.
- Create **one additional group** more than the number of online redo log groups.

ALTER DATABASE ADD STANDBY LOGFILE (‘+REDO') SIZE XXM;
ALTER DATABASE ADD STANDBY LOGFILE (‘+REDO') SIZE XXM;
ALTER DATABASE ADD STANDBY LOGFILE (‘+REDO') SIZE XXM;
ALTER DATABASE ADD STANDBY LOGFILE (‘+REDO') SIZE XXM;

Copyright © 2018 Accenture. All rights reserved.

ORACLE DATABASE CLOUD
DATA GUARD

Database Cloud Service compute node:

Init.ora:

*.db_name='cdb1’

mkdir -p /u01/app/oracle/admin/cdb1/adump

orapwd file=/u01/app/oracle/product/12.1.0.2/db_1/dbs/orapwcdb1 password=mypass entries=10

Copyright © 2018 Accenture. All rights reserved.

ORACLE DATABASE CLOUD
DATA GUARD

Database Cloud Service compute node:

export ORACLE_SID=cdb1 sqlplus / as sysdba

STARTUP NOMOUNT PFILE='/tmp/init.ora';
rman TARGET sys/password@cdb1 AUXILIARY sys/password@cdb1_stby

DUPLICATE TARGET DATABASE FOR STANDBY
    FROM ACTIVE DATABASE
    DORECOVER
    NOFILENAMECHECK;

Copyright © 2018 Accenture. All rights reserved.

ORACLE DATABASE CLOUD
DATA GUARD

Prepare Client Connections (Ex: tnsnames.ora) + Firewall ports Database Cloud Service compute node:

ALTER SYSTEM SET dg_broker_start=true;

dgmgrl sys/password@cdb1

CREATE CONFIGURATION my_config AS PRIMARY DATABASE IS cdb1 CONNECT IDENTIFIER IS cdb1;

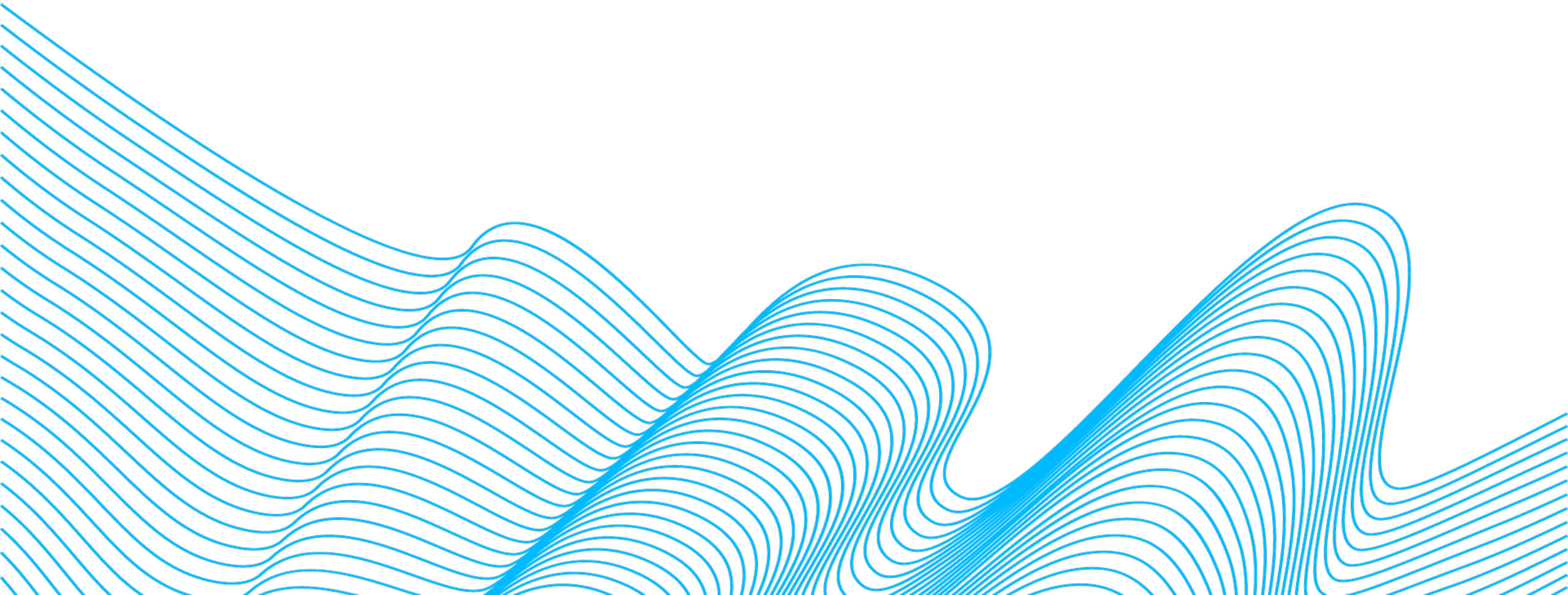
ADD DATABASE cdb1_stby AS CONNECT IDENTIFIER IS cdb1_stby MAINTAINED AS PHYSICAL;

ENABLE CONFIGURATION;

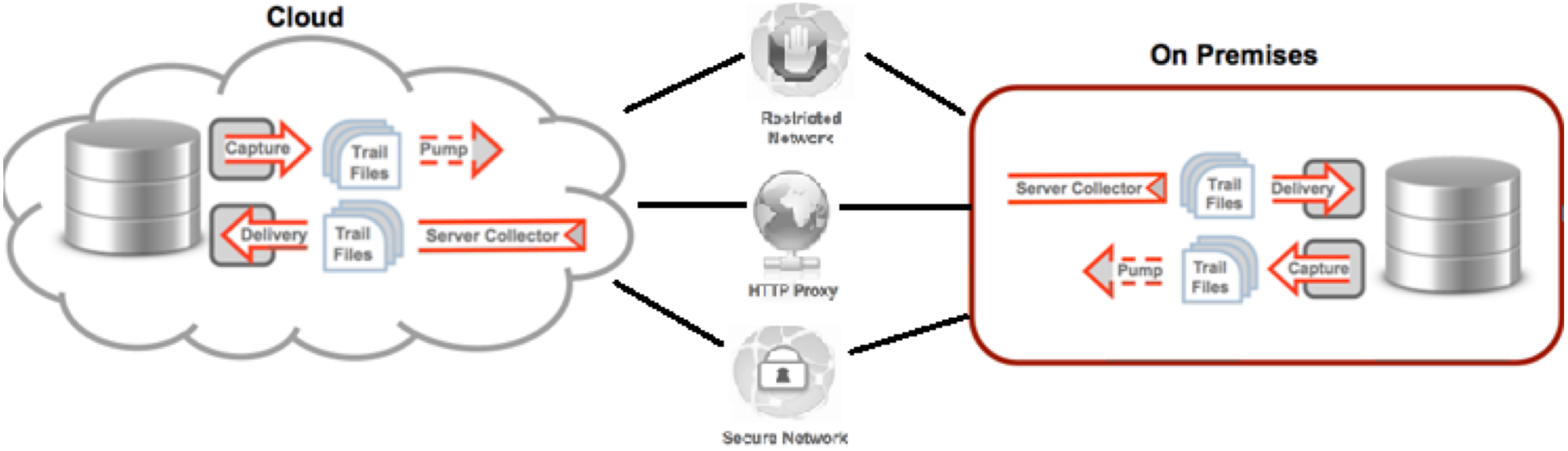
SWITCHOVER TO cdb1_stby;

Copyright © 2018 Accenture. All rights reserved.

LOAD DATA / MIGRATION
GOLDENGATE CLOUD SERVICE



ORACLE DATABASE CLOUD
GOLDENGATE AND GOLDENGATE CLOUD SERVICE



Copyright © 2018 Accenture. All rights reserved.

LOAD DATA / MIGRATION
USING GOLDENGATE CLOUD SERVICE

- Cross-endian possible
- Source version 8i and later
- Migrate from non-CDB to PDB
- Changes to database structure possible
- **Minimal downtime migration**
- **Upgrade to new version possible**

Copyright © 2018 Accenture. All rights reserved.

LOAD DATA / MIGRATION – BACKUP / RESTORE
ORACLE DATABASE CLOUD BACKUP MODULE

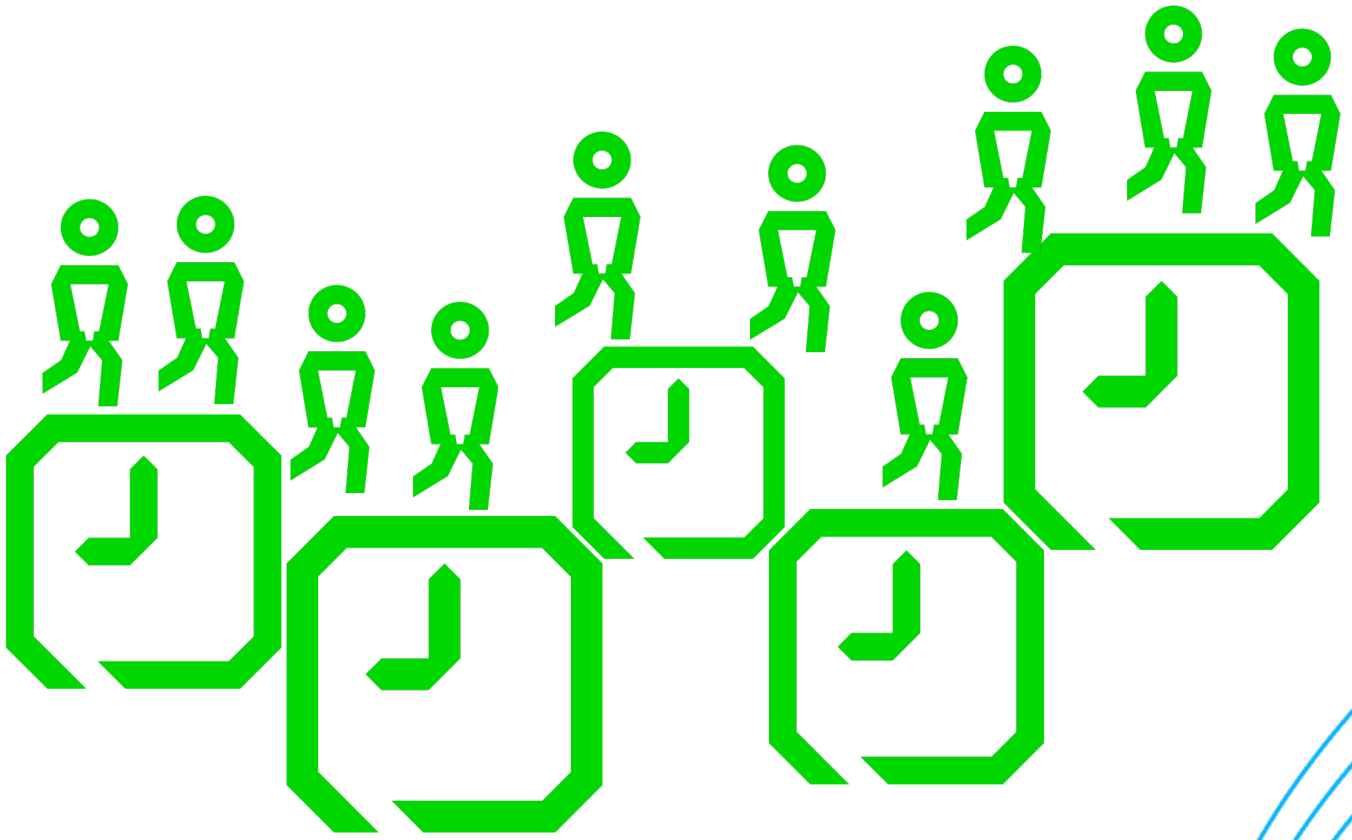
Other options:

Live on MIG360

8a. Migration Options

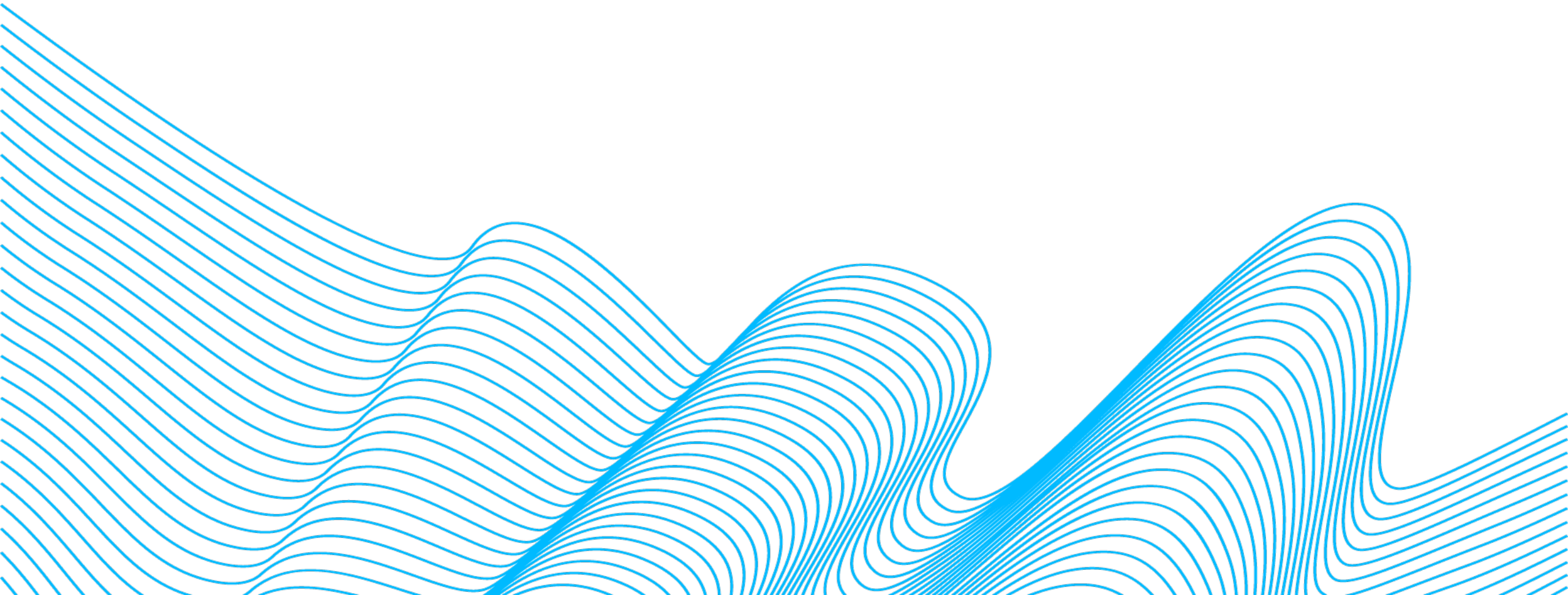
295. Data Pump Conventional Export/Import text *(57)*
296. Data Pump Conventional Export/Import - NON-CDB to CDB text *(68)*
297. Data Pump Transportable Tablespace text *(95)*
298. Data Pump Transportable Tablespace - NON-CDB to CDB text *(108)*
299. Data Pump Full Transportable text *(95)*
300. Data Pump Full Transportable - NON-CDB to CDB text *(106)*
301. RMAN Transportable Tablespace with Data Pump text *(70)*
302. RMAN Transportable Tablespace with Data Pump - NON-CDB to CDB text *(83)*
303. RMAN Transportable Tablespace with Data Pump - Incremental text *(143)*
304. RMAN Transportable Tablespace with Data Pump - Incremental - NON-CDB to CDB text *(162)*
305. RMAN CONVERT Transportable Tablespace with Data Pump text *(90)*
306. RMAN CONVERT Transportable Tablespace with Data Pump - NON-CDB to CDB text *(104)*
307. RMAN Cross-Platform Transportable Tablespace Backup Sets text *(80)*
308. RMAN Cross-Platform Transportable Tablespace Backup Sets - NON-CDB to CDB text *(93)*
309. RMAN Cross-Platform Transportable Tablespace Backup Sets - Incremental - XTTS text *(9)*
310. RMAN Incremental Backup text *(127)*
311. Unplugging/Plugging (NON-CDB) text *(81)*
312. Remote Cloning (NON-CDB) text *(49)*
313. Cloud Backup Module text *(168)*
314. Data Guard text *(133)*
315. Golden Gate (To be Implemented) text *(1)*

Copyright © 2018 Accenture. All rights reserved.



Copyright © 2018 Accenture. All rights reserved.

ORACLE DATABASE CLOUD
ORACLE SQL*LOADER



ORACLE DATABASE CLOUD
ORACLE SQL*LOADER

sqlplus scott/tiger

CREATE TABLE emp (empno number(5),
name varchar2(50),
sal number(10,2),
jdate date);

Copyright © 2018 Accenture. All rights reserved.

ORACLE DATABASE CLOUD
ORACLE SQL*LOADER

emp.ctl

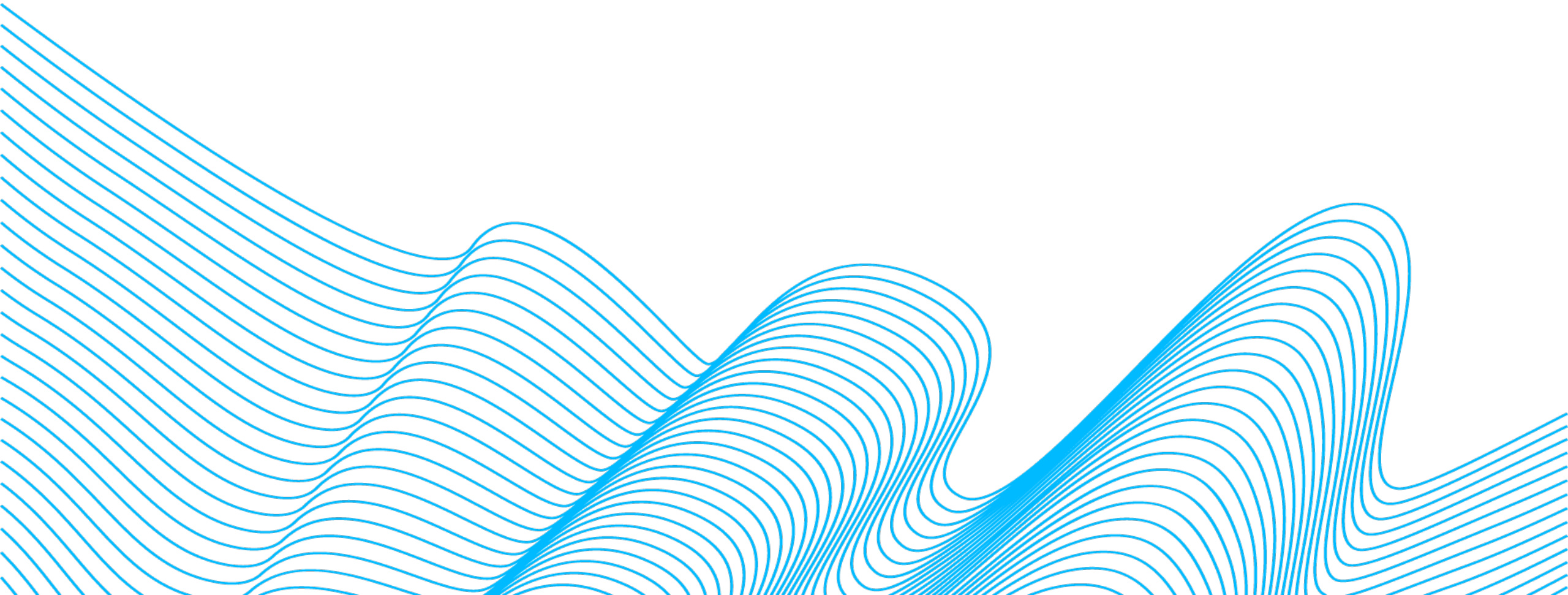
LOAD DATA
INFILE '/u01/oracle/emp.csv'
BADFILE '/u01/oracle/emp.bad' DISCARDFILE
'/u01/oracle/emp.dsc'

INSERT INTO TABLE emp
FIELDS TERMINATED BY "," OPTIONALLY ENCLOSED BY '"' TRAILING NULLCOLS
(empno,name,sal,jdate date 'mm/dd/yyyy')

sqlldr userid=scott/tiger control=emp.ctl log=emp.log

Copyright © 2018 Accenture. All rights reserved.

ORACLE DATABASE CLOUD
EXTERNAL TABLES

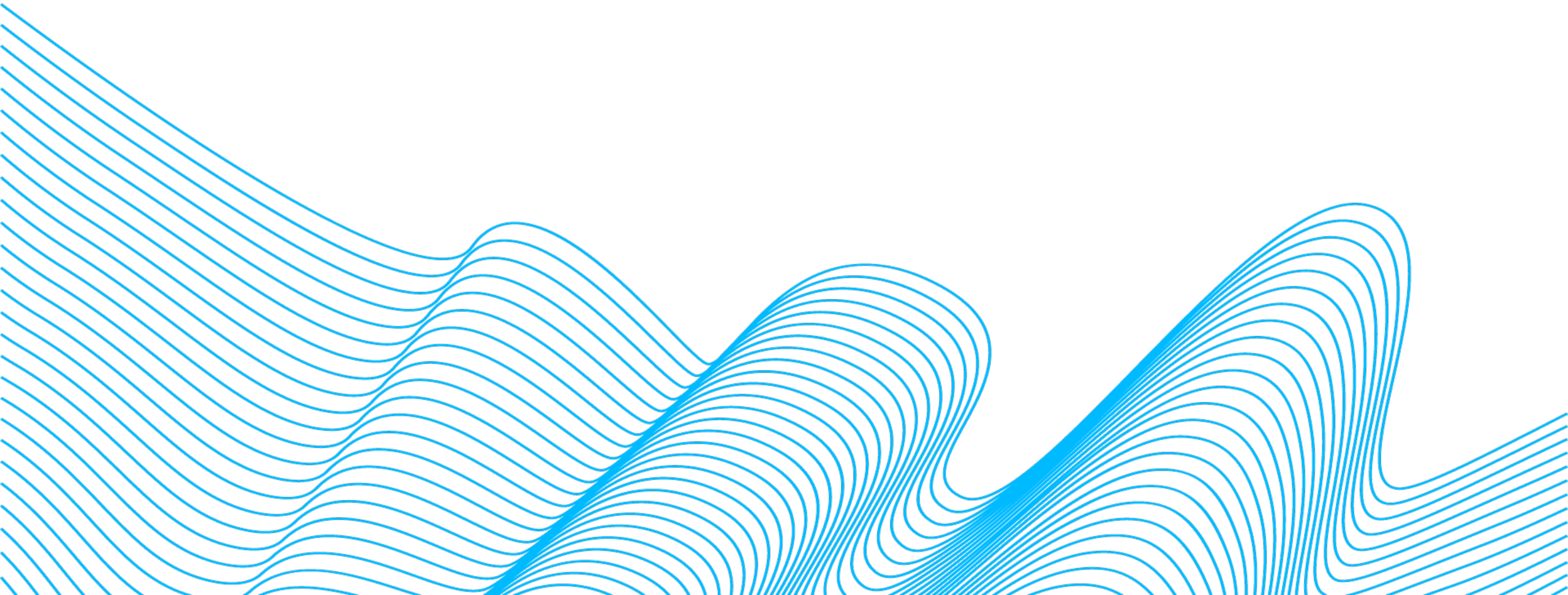


ORACLE DATABASE CLOUD
EXTERNAL TABLES

```
CREATE TABLE countries_ext (
  country_code      VARCHAR2(5),
  country_name      VARCHAR2(50),
  country_language  VARCHAR2(50)
)
ORGANIZATION EXTERNAL (
  TYPE ORACLE_LOADER
  DEFAULT DIRECTORY ext_tab_data
  ACCESS PARAMETERS (
    RECORDS DELIMITED BY NEWLINE
    FIELDS TERMINATED BY ','
    MISSING FIELD VALUES ARE NULL
    (
      country_code      CHAR(5),
      country_name      CHAR(50),
      country_language  CHAR(50)
    )
  )
  LOCATION ('Countries1.txt','Countries2.txt')
)
PARALLEL 5
REJECT LIMIT UNLIMITED;
```

Copyright © 2018 Accenture. All rights reserved.

ORACLE DATABASE CLOUD
DATABASE LINKS



ORACLE DATABASE CLOUD
DATABASE LINKS

On-premises host:

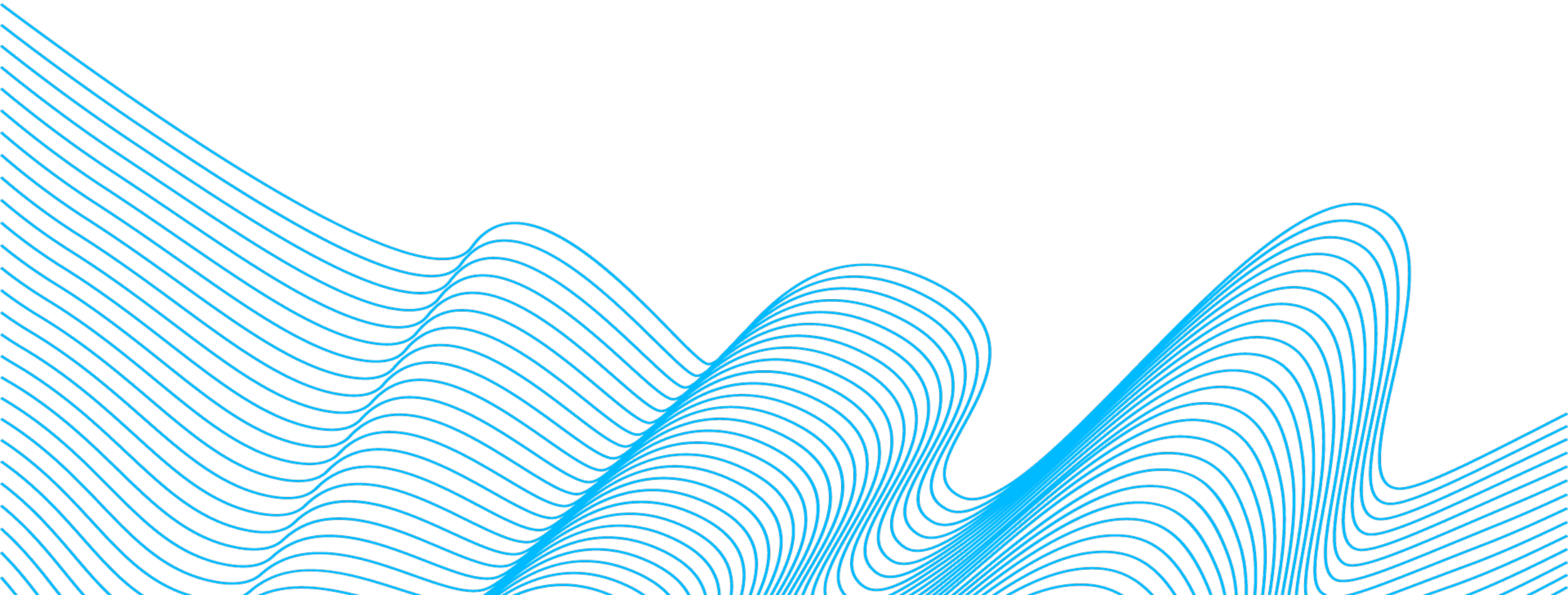
CREATE DATABASE LINK my_db_link CONNECT TO remote_user
IDENTIFIED BY remote_password USING ’MyCloudDB';

CREATE TABLE tb_test@my_db_link as SELECT* FROM my_Table;

Copyright © 2018 Accenture. All rights reserved.

ORACLE DATABASE CLOUD

DATABASE LINKS - CLONE A REMOTE PDB OR NON-CDB

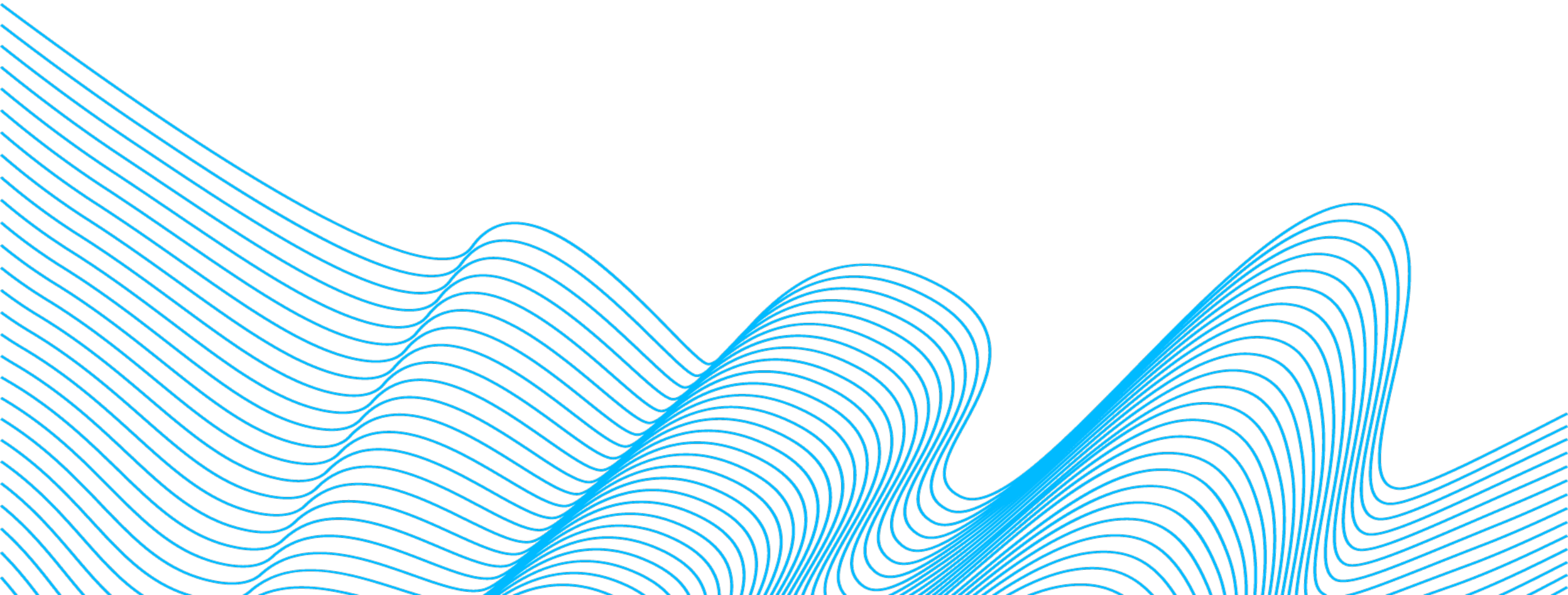


ORACLE DATABASE CLOUD
DATABASE LINKS - CLONE A REMOTE PDB OR NON-CDB

```
CREATE DATABASE LINK clone_link CONNECT TO remote_clone_user
IDENTIFIED BY remote_clone_user USING ’MyOnPremDB';

CREATE PLUGGABLE DATABASE pdb1 FROM pdb1@clone_link;

CREATE PLUGGABLE DATABASE pdb2b FROM NON$CDB@clone_link;
```

Copyright © 2018 Accenture. All rights reserved.

ORACLE DATABASE CLOUD
UNPLUGGING/PLUGGING



ORACLE DATABASE CLOUD
UNPLUGGING/PLUGGING

```
SQL>
SQL> ALTER PLUGGABLE DATABASE pdb_cdb2
  2  UNPLUG INTO '/tmp/pdb_cdb2.xml';

Pluggable database altered.

SQL> _
```

http://www.oracle.com/webfolder/technetwork/tutorials/obe/cloud/dbaas/OU/MigratingToDBaaS/Unplug_Plug_Migration/Unplug_Plug_Migration.html

Copyright © 2018 Accenture. All rights reserved.

ORACLE DATABASE CLOUD
UNPLUGGING/PLUGGING

```
[oracle@NFDBA ~]$ cd $HOME/.ssh
[oracle@NFDBA .ssh]$ scp -i DJkey.openssh oracle@[redacted]:/u02/app/oracle
/oradata/CDB2/pdb_cdb2/* /u02/app/oracle/oradata/ORCL/PDB_CDB2
Enter passphrase for key 'DJkey.openssh':
pdb_cdb2_users01.dbf                          100% 5128KB    5.0MB/s   00:00
sysaux01.dbf                                  100%  580MB   10.0MB/s   00:58
system01.dbf                                  100%  260MB    9.3MB/s   00:28
temp012015-02-17_12-55-34-PM.dbf              100%   20MB   20.0MB/s   00:00
[oracle@NFDBA .ssh]$ _
```

http://www.oracle.com/webfolder/technetwork/tutorials/obe/cloud/dbaas/OU/MigratingToDBaaS/Unplug_Plug_Migration/Unplug_Plug_Migration.html

Copyright © 2018 Accenture. All rights reserved.

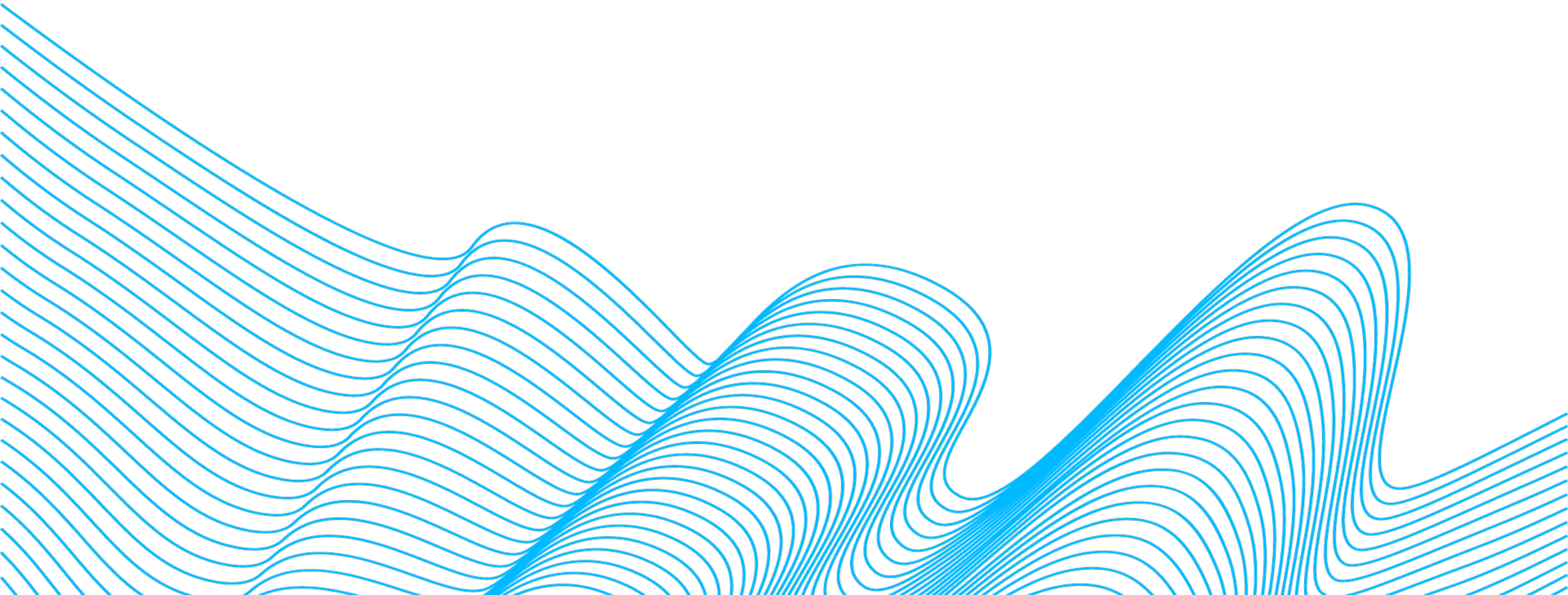
ORACLE DATABASE CLOUD
UNPLUGGING/PLUGGING

```
[oracle@NFDBA .ssh]$ . oraenv
ORACLE_SID = [ORCL] ? ORCL
The Oracle base remains unchanged with value /u01/app/oracle
[oracle@NFDBA .ssh]$ sqlplus / as sysdba

SQL*Plus: Release 12.1.0.2.0 Production on Fri Feb 20 11:29:59 2015

Copyright (c) 1982, 2014, Oracle.  All rights reserved.


Connected to:
Oracle Database 12c Enterprise Edition Release 12.1.0.2.0 - 64bit Production
With the Partitioning, Oracle Label Security, OLAP, Advanced Analytics
and Real Application Testing options

SQL> CREATE PLUGGABLE DATABASE pdb_cdb2
  2    USING '/u01/app/oracle/admin/ORCL/pdb_cdb2.xml'
  3    SOURCE_FILE_NAME_CONVERT = (
  4     '/u02/app/oracle/oradata/CDB2/pdb_cdb2',
  5     '/u02/app/oracle/oradata/ORCL/PDB_CDB2')
  6    NOCOPY
  7    TEMPFILE REUSE;

Pluggable database created.

SQL>
```

http://www.oracle.com/webfolder/technetwork/tutorials/obe/cloud/dbaas/OU/MigratingToDBaaS/Unplug_Plug_Migration/Unplug_Plug_Migration.html

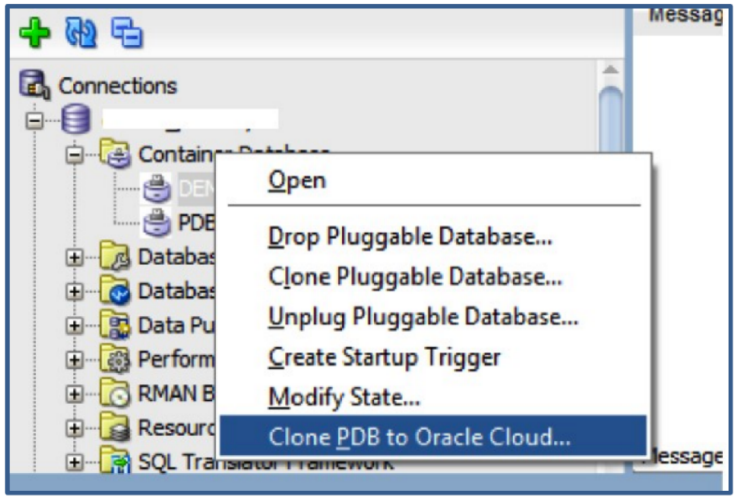
Copyright © 2018 Accenture. All rights reserved.

ORACLE DATABASE CLOUD
PLUGGABLE DATABASES (PDBS) - REMOTE CLONING

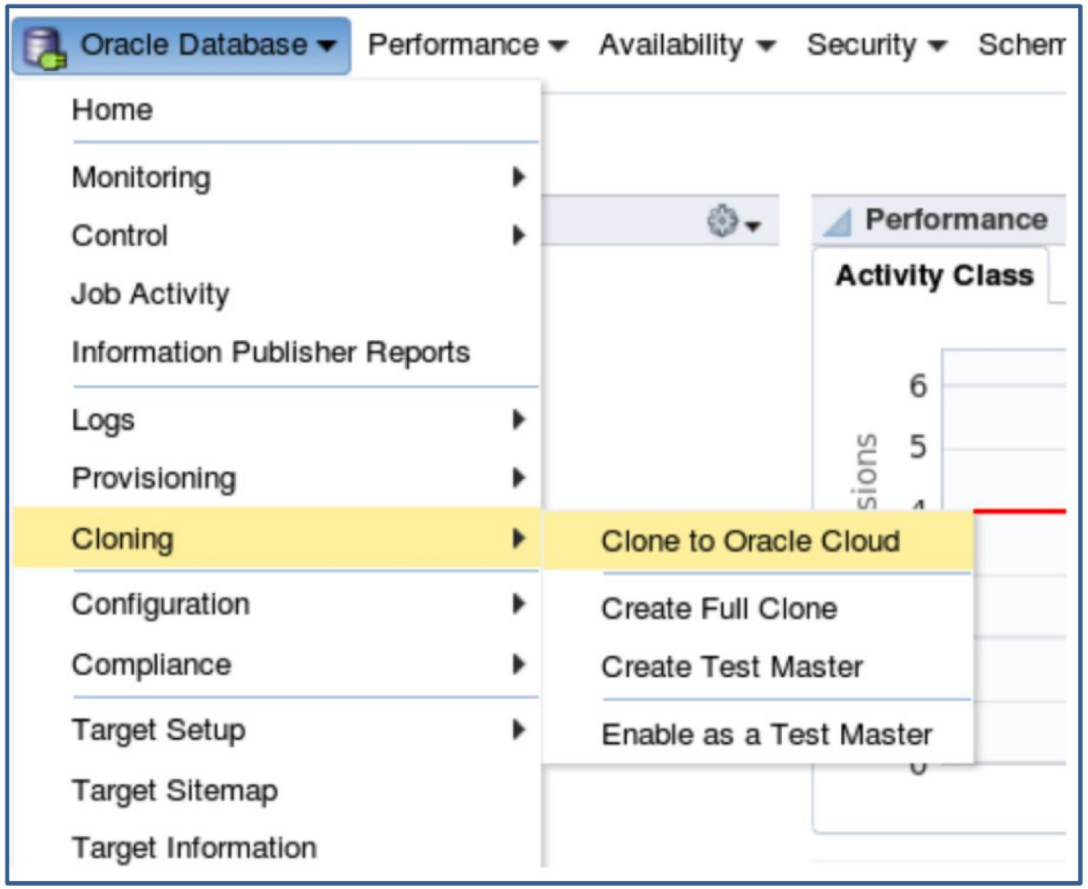


ORACLE DATABASE CLOUD
PLUGGABLE DATABASES (PDBS) - REMOTE CLONING

SQLDEVELOPER

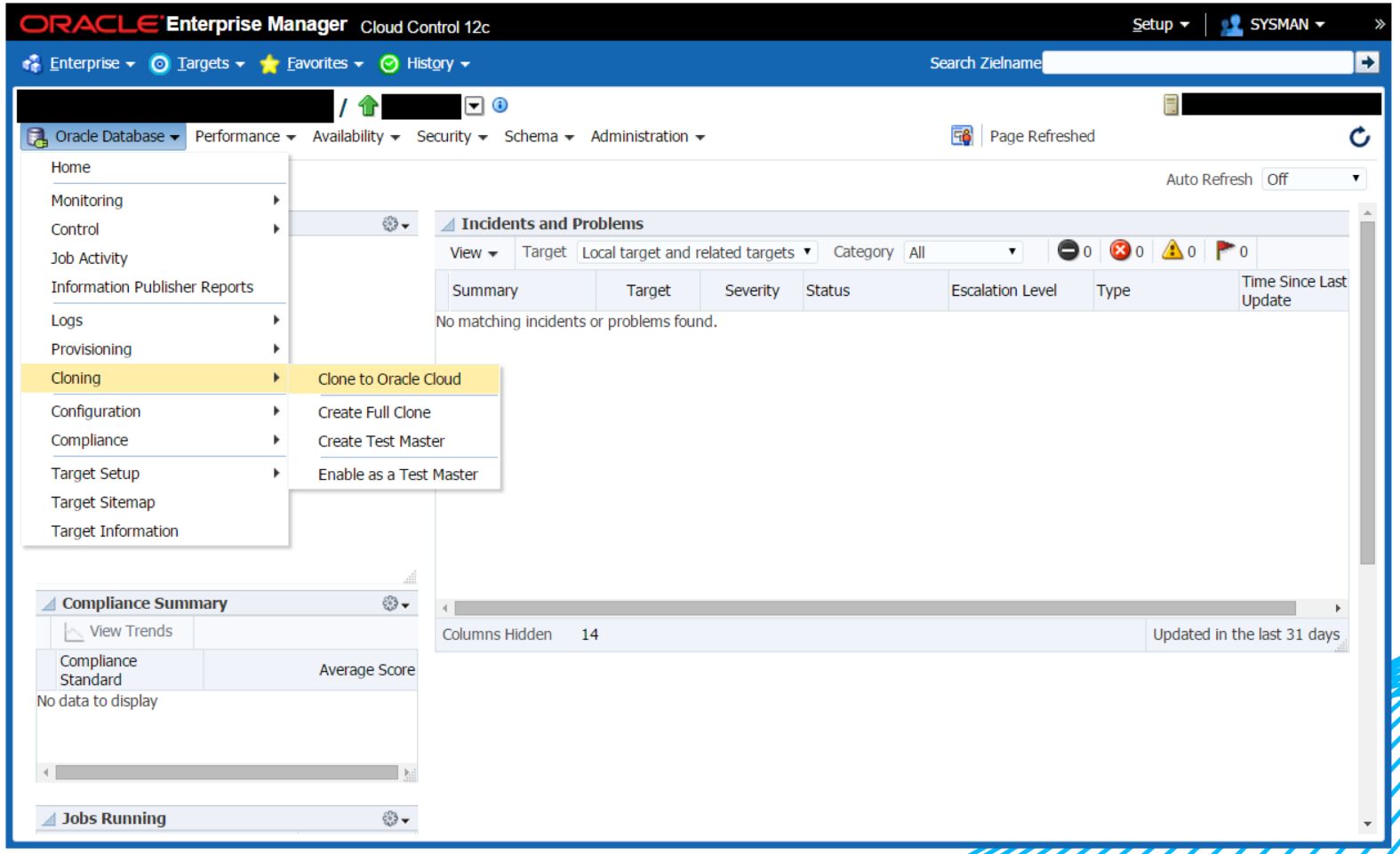


Enterprise Manager



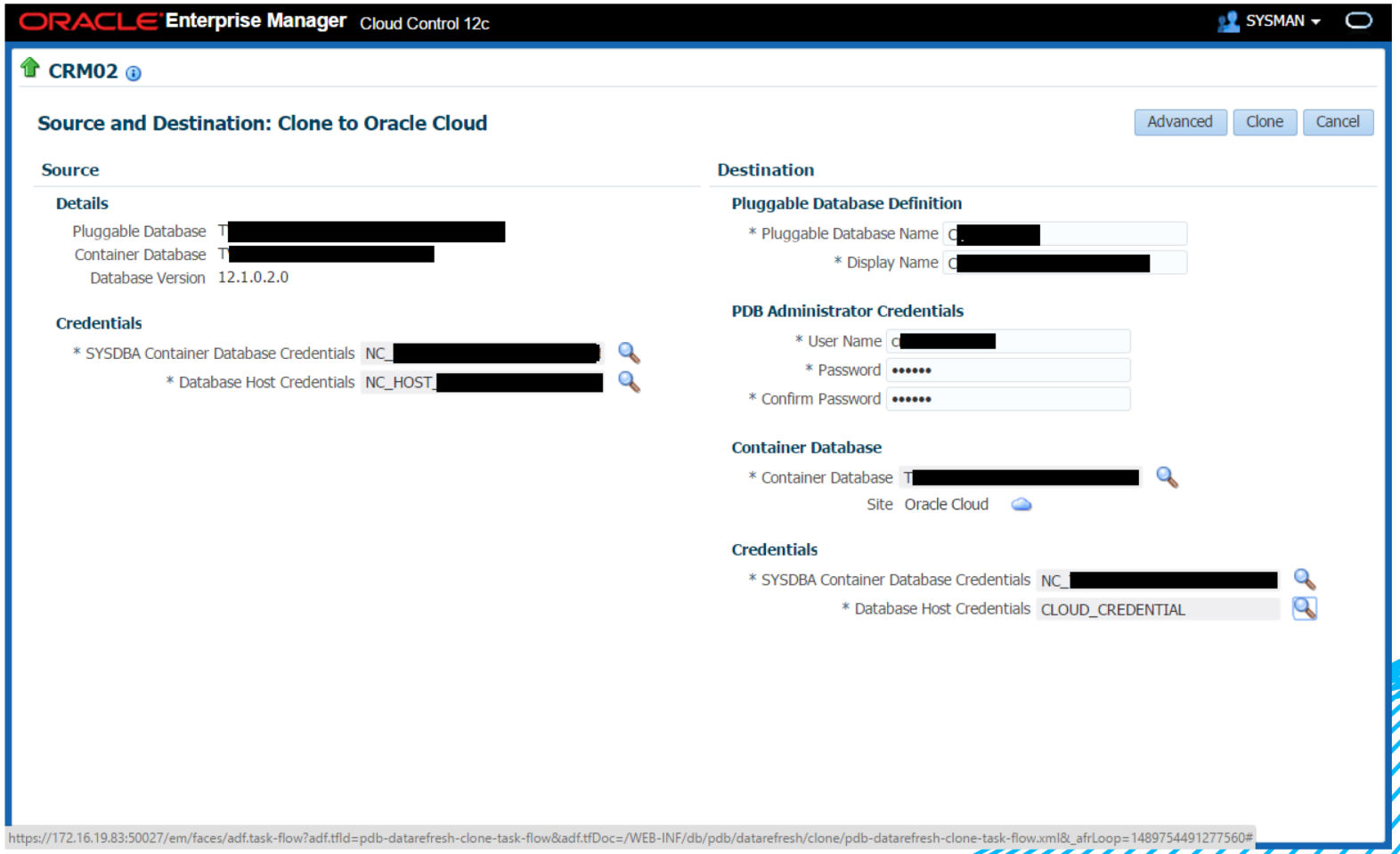
Copyright © 2018 Accenture. All rights reserved.

ORACLE DATABASE CLOUD
PLUGGABLE DATABASES (PDBS) - REMOTE CLONING



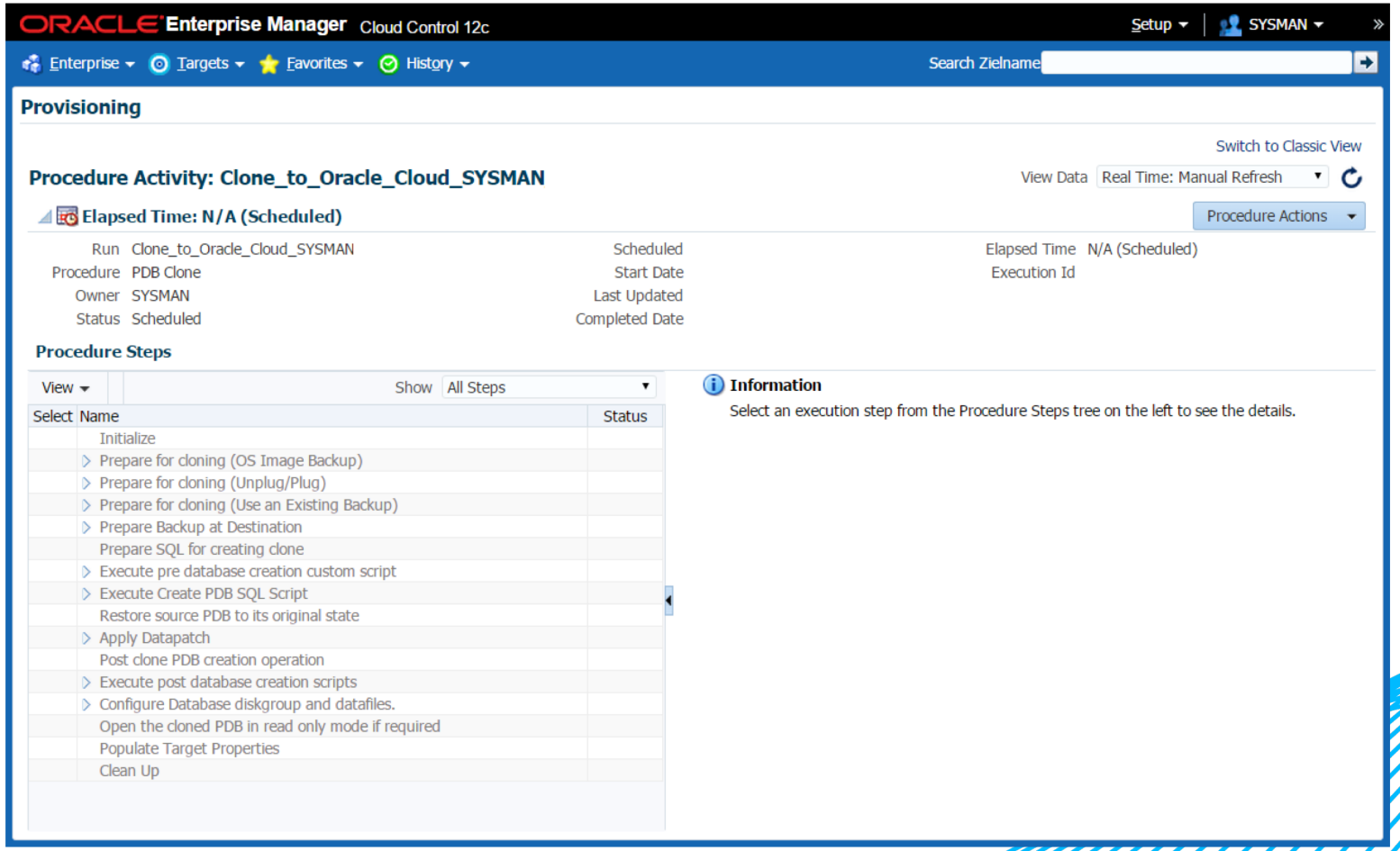
Copyright © 2018 Accenture. All rights reserved.

ORACLE DATABASE CLOUD
PLUGGABLE DATABASES (PDBS) - REMOTE CLONING



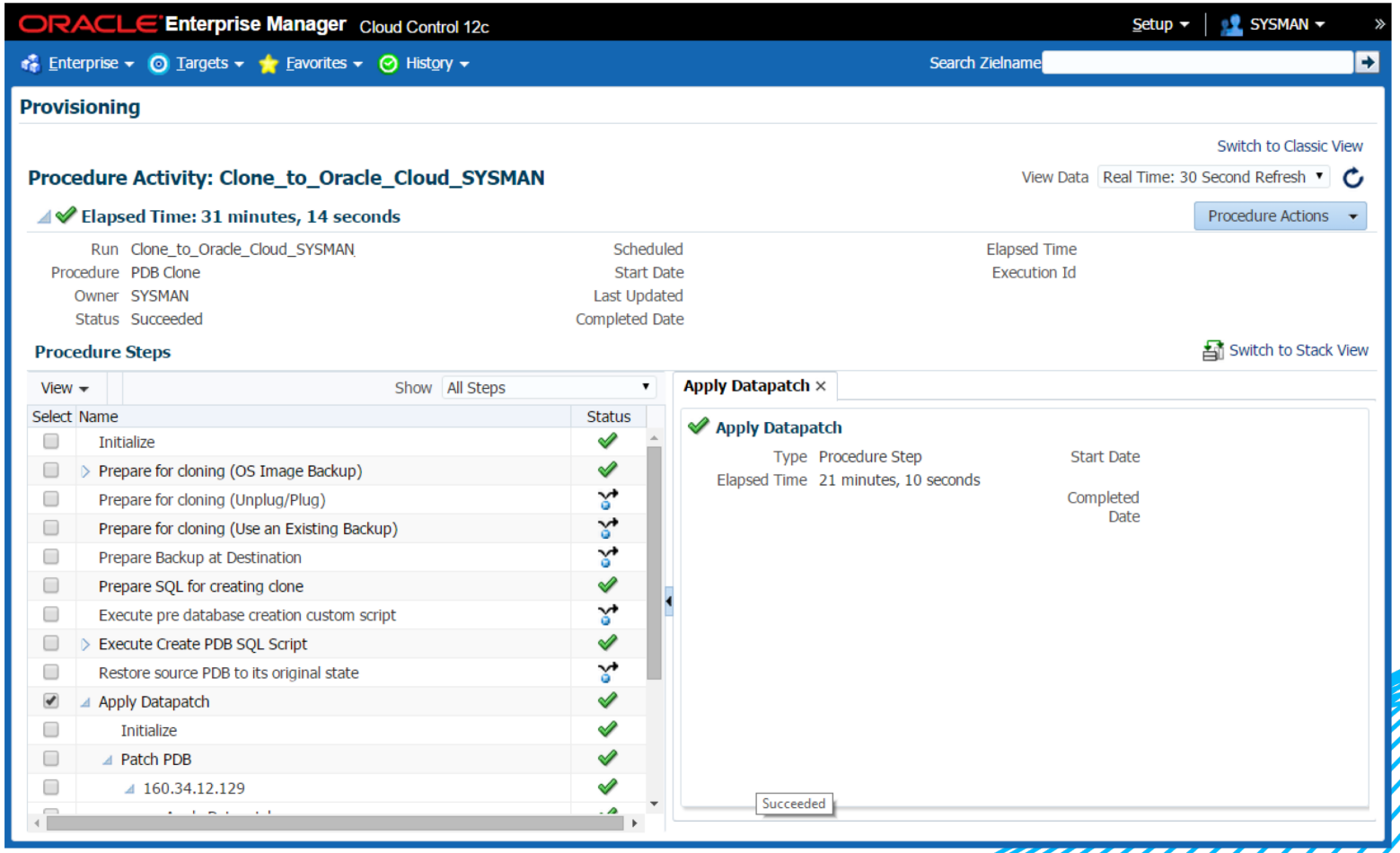
Copyright © 2018 Accenture. All rights reserved.

ORACLE DATABASE CLOUD
PLUGGABLE DATABASES (PDBS) - REMOTE CLONING



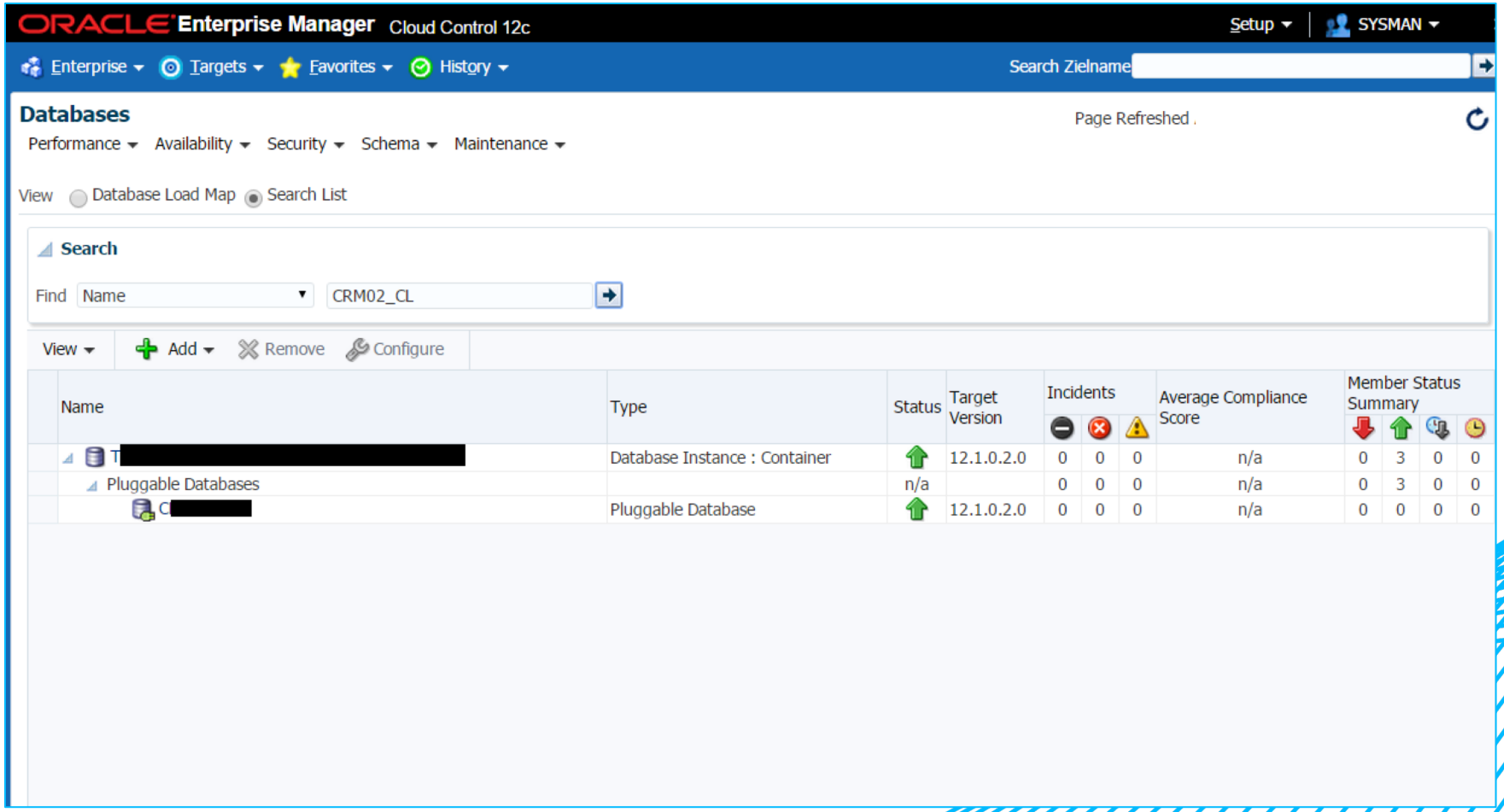
Copyright © 2018 Accenture. All rights reserved.

ORACLE DATABASE CLOUD
PLUGGABLE DATABASES (PDBS) - REMOTE CLONING



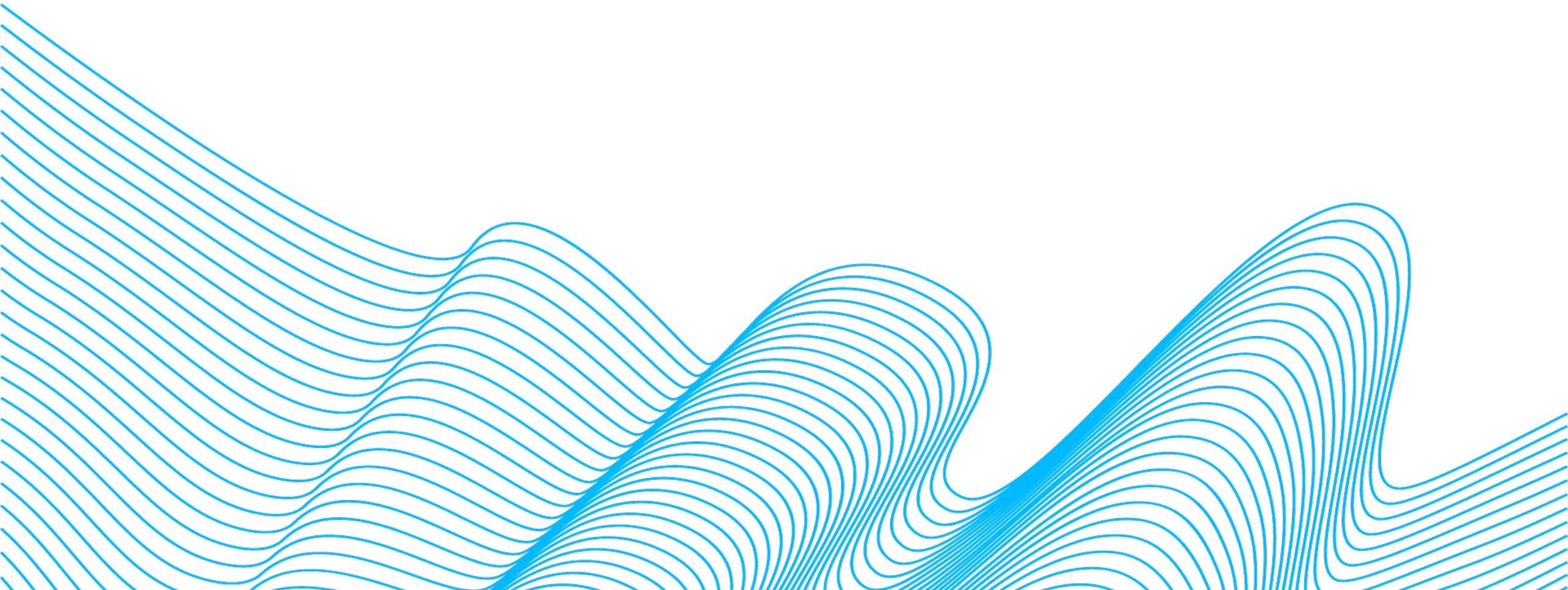
Copyright © 2018 Accenture. All rights reserved.

ORACLE DATABASE CLOUD
PLUGGABLE DATABASES (PDBS) - REMOTE CLONING

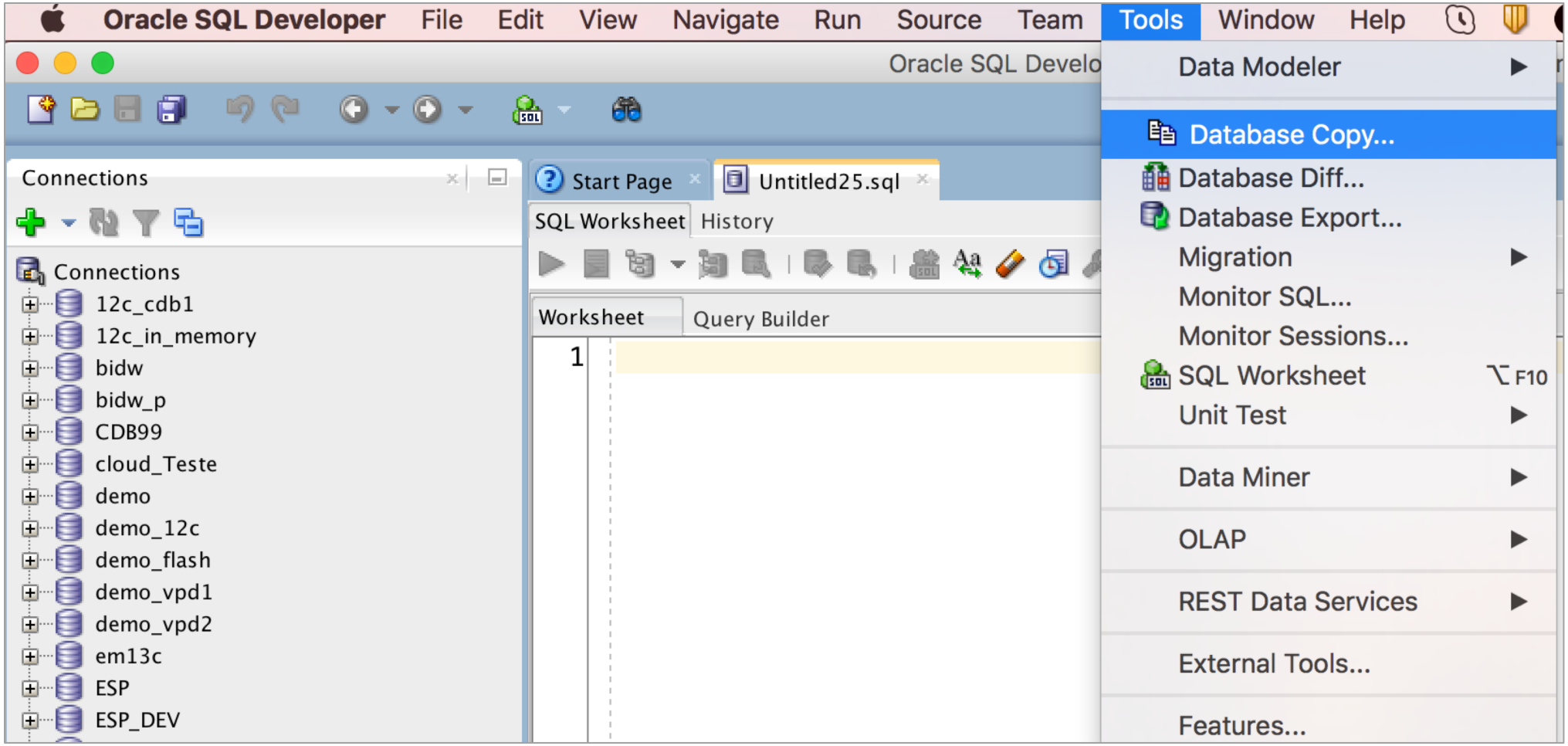


Copyright © 2018 Accenture. All rights reserved.

ORACLE DATABASE CLOUD
SQLDEVELOPER DATABASE COPY

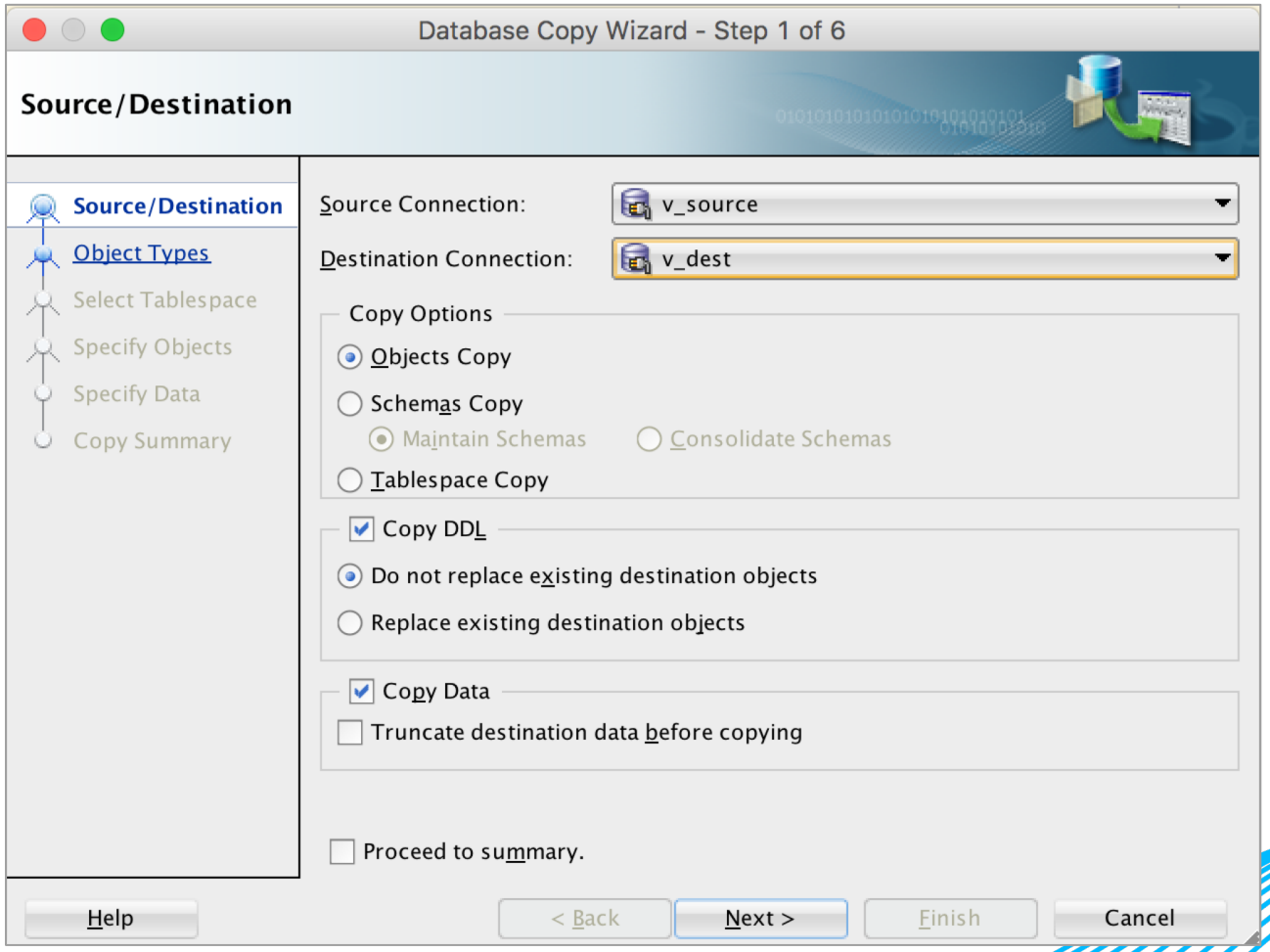


ORACLE DATABASE CLOUD
SQLDEVELOPER



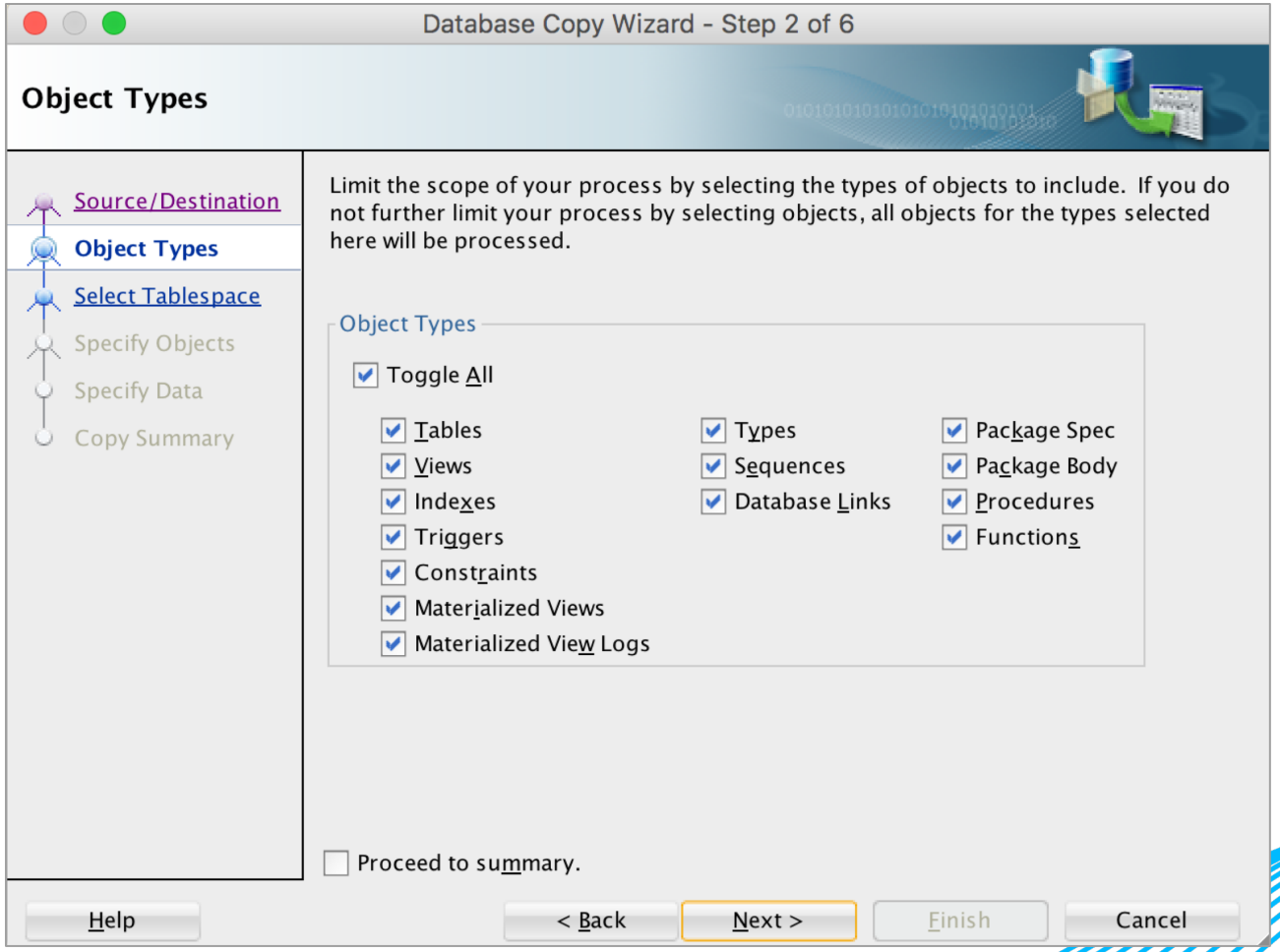
Copyright © 2018 Accenture. All rights reserved.

ORACLE DATABASE CLOUD
SQLDEVELOPER



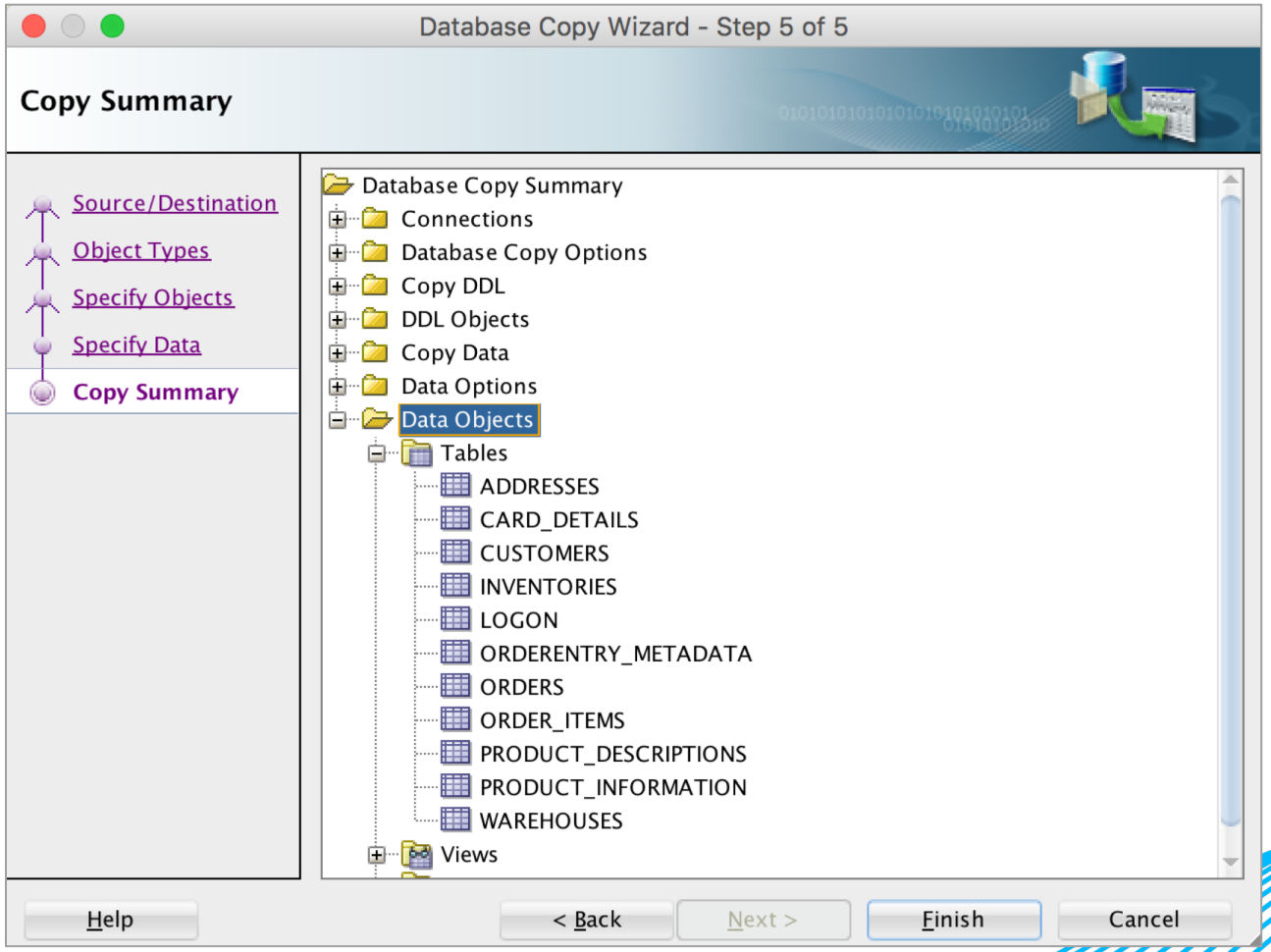
Copyright © 2018 Accenture. All rights reserved.

ORACLE DATABASE CLOUD
SQLDEVELOPER



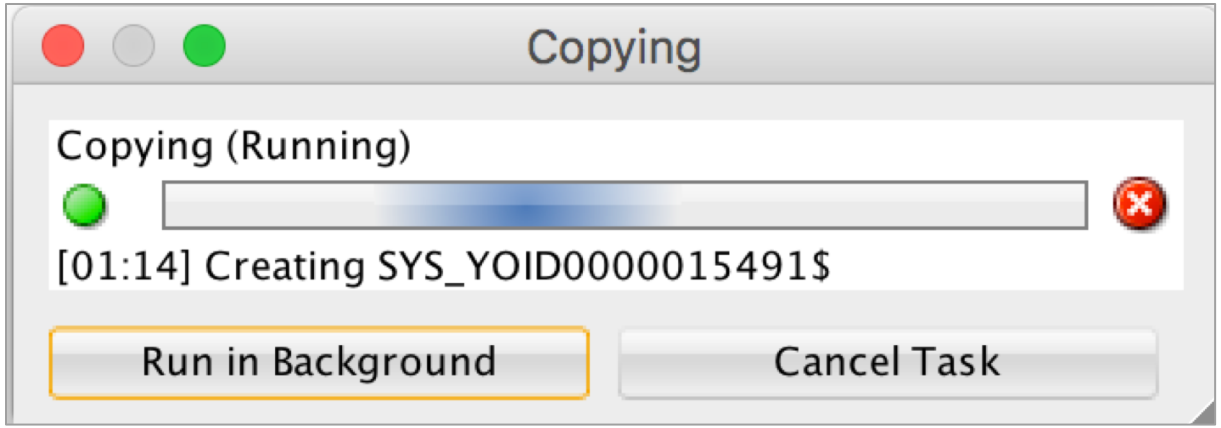
Copyright © 2018 Accenture. All rights reserved.

ORACLE DATABASE CLOUD
SQLDEVELOPER



Copyright © 2018 Accenture. All rights reserved.

ORACLE DATABASE CLOUD
SQLDEVELOPER



Copyright © 2018 Accenture. All rights reserved.

ORACLE DATABASE CLOUD
SQLDEVELOPER

```
--- START ------------------------------------------------------------------
set define off;

--------------------------------------------------------
--  DDL for Table COUNTRIES
--------------------------------------------------------

  CREATE TABLE "COUNTRIES" ("COUNTRY_ID" CHAR(2 BYTE), "COUNTRY_NAME" VARCHAR2(40 BYTE), "REGION_ID" NUMBER,  CONSTRAINT "COUNTF

   COMMENT ON COLUMN "COUNTRIES"."COUNTRY_ID" IS 'Primary key of countries table.';
   COMMENT ON COLUMN "COUNTRIES"."COUNTRY_NAME" IS 'Country name';
   COMMENT ON COLUMN "COUNTRIES"."REGION_ID" IS 'Region ID for the country. Foreign key to region_id column in the departments t
   COMMENT ON TABLE "COUNTRIES"  IS 'country table. Contains 25 rows. References with locations table.';


Table "COUNTRIES" created.


Comment on column "countries"."country_id" 'PRIMARY KEY OF COUNTRIES TABLE.' succeeded.


Comment on column "countries"."country_name" 'COUNTRY NAME' succeeded.


Comment on column "countries"."region_id" 'REGION ID FOR THE COUNTRY. FOREIGN KEY TO REGION_ID COLUMN IN THE DEPARTMENTS TABLE.'


Comment on table "countries" 'COUNTRY TABLE. CONTAINS 25 ROWS. REFERENCES WITH LOCATIONS TABLE.' succeeded.


set define off;
```

Copyright © 2018 Accenture. All rights reserved.

OTHER OPTIONS TO EXPLORE

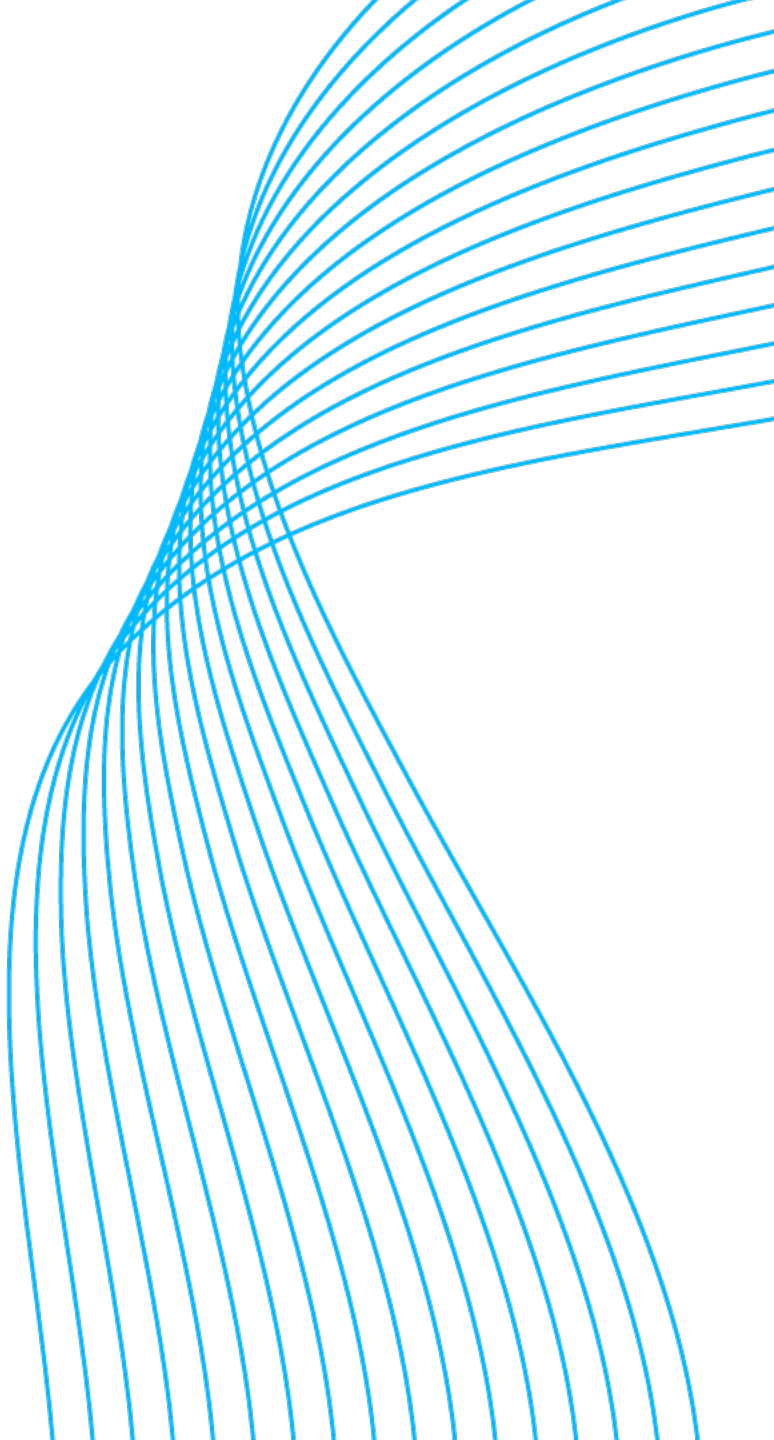
- Oracle Zero Downtime Migration
- MV2ADB
- MV2OCI
- Ansible Database Migration Tool utility

Copyright © 2018 Accenture. All rights reserved.

QUESTIONS?

THANK YOU

Slides will be available at www.slideshare.net



...whatever you do, do it all for the glory of God.
1 Corinthians 10:31