

# Oracle Database Backup Cloud Service for On-Premises Databases

Matheus Boesing

Oct 2019

Pythian

**24.**hroug  
godisnja konferencija

# Matheus Boesing

Oracle Database 12c Maximum Availability Certified Expert (OCE)  
Oracle Database 12c Performance Management and Tuning Certified Expert (OCE)  
Oracle Database 12c Data Guard Administrator Certified Expert (OCE)  
Oracle Database 12c RAC and Grid Infrastructure Administrator Certified Expert (OCE)  
Oracle Database 12c Administrator Certified Professional (OCP)  
Oracle Database SQL Certified Expert (OCE)  
Oracle Enterprise Manager 12c Certified Implementation Specialist (OCS)  
Oracle Database 11g Performance Tuning Certified Expert (OCE)  
Oracle Real Application Clusters 11g Certified Implementation Specialist (OCS)  
Oracle Database 11g Certified Implementation Specialist (OCS)  
Oracle Database 11g Administrator Certified Professional (OCP)  
Oracle Database 11g Administrator Certified Associate (OCA)  
EXIN: Certified Integrator Secure Cloud Services  
EXIN: Cloud Computing Foundation  
ITIL® Foundation Certificate in IT Service Management  
ISO/IEC 20000 – IT Service Management Foundation  
ISO/IEC 27002 – Information Security Foundation  
EXIN: Green IT Citizen  
COBIT 4.1 Foundation for IT Services  
Microsoft Technology Associate – SQL Server (MTA)



@matheusdba



linkedin.com/in/matheusboesing/



**ORACLE®**  
ACE Director



# Matheus Boesing

Oracle Database 12c Maximum Availability Architecture  
Oracle Database 12c Performance Tuning  
Oracle Database 12c Data Guard  
Oracle Database 12c RAC and Grid Infrastructure  
Oracle Database 12c Administration  
Oracle Database SQL Certified Expert  
Oracle Enterprise Manager 12c  
Oracle Database 11g Performance Tuning  
Oracle Real Application Clusters  
Oracle Database 11g Certified Specialist  
Oracle Database 11g Administration  
Oracle Database 11g Administration  
EXIN: Certified Integrator Specialist  
EXIN: Cloud Computing Foundation  
ITIL® Foundation Certificate  
ISO/IEC 20000 – IT Service Management  
ISO/IEC 27002 – Information Security  
COBIT 4.1 Foundation for IT Governance  
Microsoft Technology Associate



**Matheus Boesing**

Lead Database Consultant at Pythian |  
Oracle ACE ♠



@matheusdba



linkedin.com/in/matheusboesing/



**ORACLE®**  
ACE Director

**ORACLE®**

Certified Expert

Oracle Database 12c  
Maximum Availability  
Architecture

**ORACLE®**

Certified Expert

Oracle Database 12c  
Performance Management  
and Tuning

**ORACLE®**

Certified Expert

Oracle Database 12c:  
Oracle RAC and Oracle  
Grid Infrastructure  
Administrator

**ORACLE®**

Certified Expert

Oracle Database SQL

**ORACLE®**

Certified Expert

Oracle Database 12c  
Data Guard Administrator

**ORACLE®**

Certified Expert

Oracle Database 11g  
Performance Tuning

**ORACLE®**

Certified Professional

Oracle Database 12c  
Administrator

**ORACLE®**

Certified Specialist

Oracle Database 11g  
Administrator

**ORACLE®**

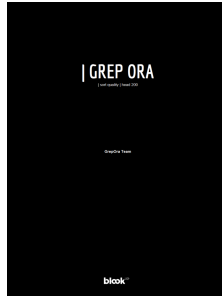
Certified Professional

Oracle Database 11g  
Administrator



g r e p o r a  
e x p e r t i s e

ORACLE  
TECHNOLOGY NETWORK  
LatinAmerica



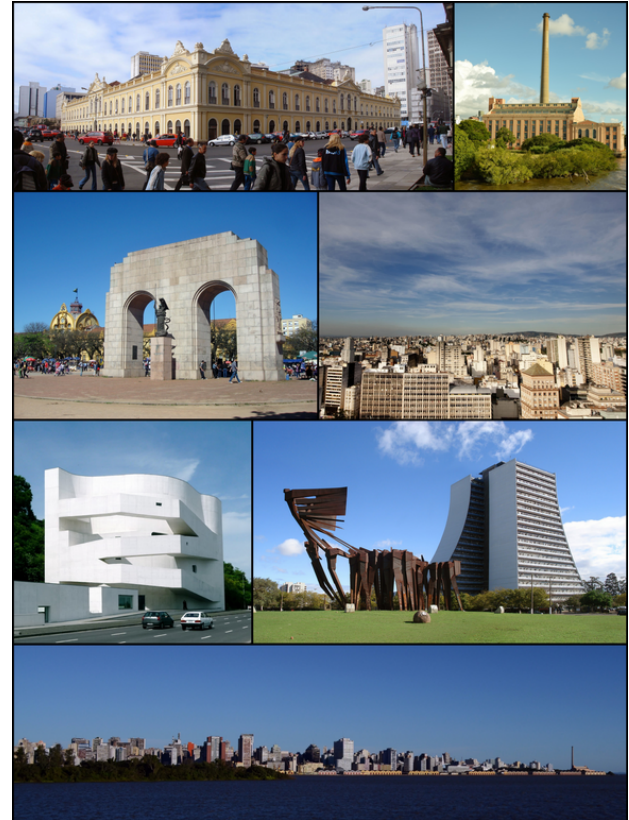


# Matheus Boesing

DO YOU KNOW  
HOW BIG BRAZIL IS?



Porto Alegre, Rio Grande do Sul (1,6M ha - 5th)



# Pythian

love your data



EXPERIENCED

11,800

Systems currently managed by Pythian



GLOBAL

400

Pythian experts in 35 countries



EXPERTS

2

Millennia of experience gathered and shared over 19 years

# AGENDA

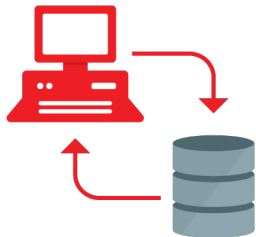
- Backup Strategies and Off-Site Backups
- Database Backup Service (ODBCS): What?
- How does that work?
- How to install? Configure? Backup/Restore? (Demo)
- How much does it cost?
- Analysis: Pros x Cons
- ODBCS Implementation Strategies



# Backup Storage Strategies: A Summary

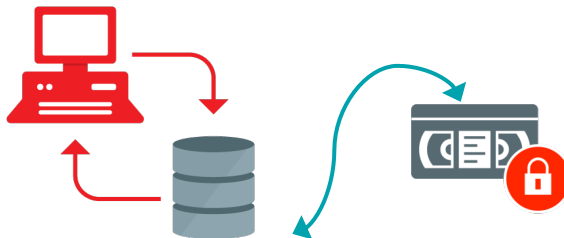
## Local Disks

- It's local
- Short retention (7 days)
- Lowest RTO
- Risk: If I lose the server/DC?



## On-site Layered Backups

- Disk-2-Disk (Ex: 30 dias)
- Disk-2-Tape (Ex: 90 dias)
- Low RTO
  - Still local risks
- Higher Retention
  - Remote disks/tape.



## Off-site Storage

- External Tape Vaulting
- Long Term Retention (years)
- SOX Compliant
  - RPO? RTO? TCO? ☹️





# Backup Off-Site for On-Premises Databases

- Sarbanes-Oxley Act (SOX) - 2002
- Magnetic Tape: VTL (D2T, D2D2T, MML + Vendor?)



- TCO? (Storage + Tapes+ Transport/Storage + VTL Solution, ...)
- RPO? ☹️
- RTO?? ☹️

\$\$\$\$\$\$\$\$

*Restore Test is Done?*

*Elasticity?*

*Physical Failures?*

*Operational Cost*


*Adoption Cost*

...

# Oracle Database Backup to Cloud Service

## Using Oracle Database Backup Cloud Service

☰

Table of Contents 

- Title and Copyright Information
- + Preface
- 1 Getting Started with Oracle Database Backup Cloud Service

---

- About Oracle Database Backup Cloud Service
- About Backup and Recovery Using Oracle Database Backup Cloud Service
- About the Oracle Database Cloud Backup Module for OCI
- About the Oracle Database Cloud Backup Module for OCI Classic
- Important Information About Oracle Database Backup Cloud Service Subscriptions
- How to Begin with Oracle Database Backup Cloud Service Subscriptions

### 1 Getting Started with Oracle Database Backup Cloud Service

Oracle Database Backup Cloud Service is a cloud storage solution for storing Oracle Database backups. Here's what you need to know to get started.

#### Topics

- [About Oracle Database Backup Cloud Service](#)
- [About Backup and Recovery Using Oracle Database Backup Cloud Service](#)
- [About the Oracle Database Cloud Backup Module for OCI](#)
- [About the Oracle Database Cloud Backup Module for OCI Classic](#)
- [Important Information About Oracle Database Backup Cloud Service Subscriptions](#)
- [How to Begin with Oracle Database Backup Cloud Service Subscriptions](#)
- [Frequently Asked Questions for Oracle Database Backup Cloud Service](#)

<https://docs.oracle.com/en/cloud/paas/db-backup-cloud>

# ODBCS: Requirements...

- ODBCS -> Oracle Storage Cloud Service

Service: Oracle Cloud Infrastructure Object Storage Classic Open Service Console

**Overview** Billing Metrics Billing Alerts Monitoring Metrics Business Metrics Documents

## Overview Information

Category	Oracle IaaS and PaaS Cloud Services
Cloud Account Name	grepora
Cloud Account Id	cacct-efbb4f4928ed452daf9a0e32b5
Subscription	Monthly Flex

## Additional Information

Plan	<a href="#">Oracle Cloud Infrastructure Object Storage Classic</a>	Identity Service Id	idcs-59a7c6-42284f5e
Service Start Date	26-Dec-2018	Status	Active
Subscription ID	72C	Buyer	matheus@boesing.com.br
Service Instance ID	615	REST Endpoint (Permanent)	https://Storage-3a144116502940e-01f78b6.br.storage.orac
Customer Account	<a href="#">GrepOra.com</a>	REST Endpoint	https://grepora.br.storage.oraclecloud.com/v1/Storage-grepora
CSI Number	22052016	Auth V1 Endpoint	https://grepora.br.storage.oraclecloud.com/auth/v1.0

# ODBCS: How does that work?

- RMAN -> Oracle Database Cloud Backup Module (ODBCM) – MML
  - You can all all your existent scripts & backup strategy 😊
- Automatically used for DBaaS
- Compression
  - High, Medium, Low, Basic, Normal
- Encryption
  - Transparent Encryption of Backups: Oracle Wallet (TDE)
  - Password Encryption of Backups: Key-Word
  - Dual Mode Encryption of Backups: Both
- Triple and Transparent Replication
- Elasticity: Pay-As-You-Go
- Restriction: 10gR2+





# ODBCS: How to Install?

- Oracle Cloud Account
- Download ODBC: [http://download.oracle.com/otn/other/opc\\_installer.zip](http://download.oracle.com/otn/other/opc_installer.zip)
- Install ODBC:

```
[oracle@dbsrvr cloud]$ java -jar opc_install.jar -serviceName Storage -  
identityDomain GrepOra -opcId 'matheus@boeing.com.br' -opcPass 'HrOUG2019' -  
walletDir /db/walletprfl -libDir /db/libprfl -proxyHost "10.10.10.10" -  
proxyPort 6060
```

```
Oracle Database Cloud Backup Module Install Tool, build 2017-04-04
```

```
Oracle Database Cloud Backup Module credentials are valid.
```

```
Oracle Database Cloud Backup Module wallet created in directory /db/walletprfl
```

```
Oracle Database Cloud Backup Module initialization file  
/u01/app/oracle/product/11.2/dbs/opccloudtest.ora created.
```

```
Downloading Oracle Database Cloud Backup Module Software Library from file opc_linux64.zip.
```

```
Downloaded 26933594 bytes in 6 seconds. Transfer rate was 4488932 bytes/second.
```

```
Download complete.
```

# ODBCS: How to Configure?

```
RMAN> CONFIGURE DEFAULT DEVICE TYPE TO 'SBT_TAPE';  
new RMAN configuration parameters are successfully stored
```

```
RMAN> CONFIGURE CHANNEL DEVICE TYPE 'SBT_TAPE'  
        PARS='SBT_LIBRARY=/db/libprfl/libopc.so,  
  
SBT_PARS=(OPC_PFILE=/u01/app/oracle/product/11.2/dbs/opcloudtest.ora)';  
new RMAN configuration parameters are successfully stored
```

- *Optional* -> Explicit Allocation:

```
RMAN> run{  
    ALLOCATE CHANNEL c1 DEVICE TYPE 'SBT_TAPE'  
        PARS='SBT_LIBRARY=/db/libprfl/libopc.so,  
        SBT_PARS=(OPC_PFILE=/u01/app/oracle/product/11.2/dbs/opcloudtest.ora)';  
    ### Commands  
    RELEASE CHANNEL c1;  
}
```

# ODBCS: How to Backup?

```
RMAN> SET ENCRYPTION ON IDENTIFIED BY "HrOUG2019" only;
executing command: SET encryption
RMAN> backup datafile 1;
Starting backup at 03-MAY-2017 19:25:05
using channel ORA_SBT_TAPE_1
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=/db/u1001/teste/cloud_test/system01.dbf
channel ORA_SBT_TAPE_1: starting piece 1 at 03-MAY-2017 19:25:05
channel ORA_SBT_TAPE_1: finished piece 1 at 03-MAY-2017 19:31:10
piece handle=0or4mdgh_1_1 tag=TAG20170503T192505 comment=API Version 2.0,MMS Version 3.15.12.30
channel ORA_SBT_TAPE_1: backup set complete, elapsed time: 00:06:05
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
including current SPFILE in backup set
channel ORA_SBT_TAPE_1: starting piece 1 at 03-MAY-2017 19:31:11
channel ORA_SBT_TAPE_1: finished piece 1 at 03-MAY-2017 19:31:26
piece handle=0pr4mdru_1_1 tag=TAG20170503T192505 comment=API Version 2.0,MMS Version 3.15.12.30
channel ORA_SBT_TAPE_1: backup set complete, elapsed time: 00:00:15
Finished backup at 03-MAY-2017 19:31:26
```

# ODBCS: Where is my Backup?

```
RMAN> list backup of datafile 1;
using target database control file instead of recovery catalog
List of Backup Sets
=====
BS Key   Type LV   Size          Device Type Elapsed Time   Completion Time
-----  -
5        Full    229.25M      SBT_TAPE      00:04:42      03-MAY-2017 19:31:10
BP Key:  5   Status: AVAILABLE Compressed: YES Tag: TAG20170503T192505
Handle:  0sr4mdun_1_1 Media: grepora.storage.oraclecloud.com/v1/Storage-grepora/oracle-data-s
List of Datafiles in backup set 1

File LV Type   Ckp SCN     Ckp Time          Name
----  -
1      Full 1044828    03-MAY-2017 19:31:10 /db/u1001/teste/cloud_test/system01.dbf
```



# ODBCS: How do I Restore?

```
RMAN> SET DECRYPTION IDENTIFIED BY "HrOUG2019";
RMAN> restore datafile 1;
Starting restore at 03-MAY-2016 20:00:58
using channel ORA_SBT_TAPE_1
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 /db/u1001/teste/cloud_test/system01.dbf
channel ORA_SBT_TAPE_1: reading from backup piece 0sr4mdun_1_1
channel ORA_SBT_TAPE_1: piece handle=0sr4mdun_1_1 tag=TAG20160503T192505
channel ORA_SBT_TAPE_1: restored backup piece 1
channel ORA_SBT_TAPE_1: restore complete, elapsed time: 00:00:03
Finished restore at 03-MAY-2016 20:01:02
```

**DEMO**

# ODBCS: How much does that Cost?

- Metered x Non-Metered

## Non-metered Services

### Database Backup

Product	Price	Features
Database Backup Service	\$33.00 / TB / Month	<ul style="list-style-type: none"><li>• Unlimited Oracle Database backups</li><li>• Automatic three-way data mirroring</li><li>• Regional data isolation</li><li>• Transparent access via Oracle Database Cloud Backup Module and Recovery Manager (RMAN)</li><li>• RMAN encryption and compression</li></ul>

# ODBCS: How much does that Cost?

## Storage Capacity

Product	Pay As You Go (GB Per Month)	Monthly Flex (GB Per Month)
First TB/month	\$0.0396	\$0.0264
Next 49 TB/month	\$0.039	\$0.026
Next 450 TB/month	\$0.0383	\$0.0255
Next 500 TB/month	\$0.0377	\$0.0251
Next 4,000 TB/month	\$0.0369	\$0.0246
Over 5,000 TB/month	\$0.0363	\$0.0242

# ODBCS: How much does that Cost?

Data Transfer (Outbound)

Product	Pay As You Go (GB Per Month)	Monthly Flex (GB Per Month)
First Gigabyte/month	Free	Free
Next 9.999 TB/month	\$0.18	\$0.12
Next 40 TB/month	\$0.135	\$0.09
Next 100 TB/month	\$0.105	\$0.07
Next 350 TB/month	\$0.075	\$0.05
Over 500 TB/month	\$0.075	\$0.05

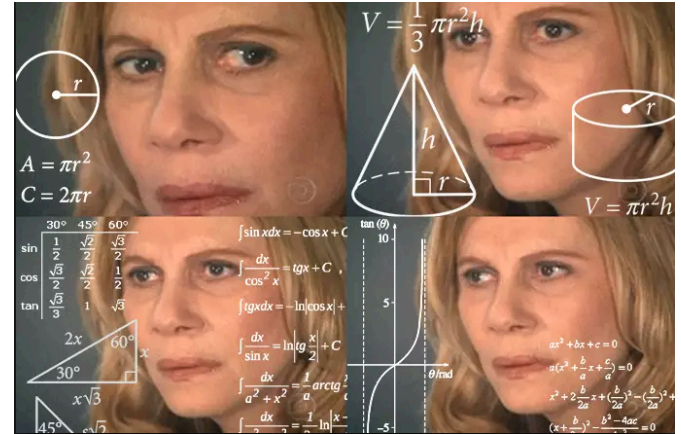
# ODBCS: How much does that Cost?

## Requests

Product	Pay As You Go	Monthly Flex	Part Number	Metric
PUT, COPY, POST or LIST requests	\$0.0075	\$0.005	B88296	1,000 Requests / Month
GET and all other requests	\$0.006	\$0.004	B88295	10,000 Requests / Month

# ODBCS: How much does that Cost?

- Example: For a 1TB Backup Space...
- **Non-Metered: \$33/TB/Month.**
- Metered (Flex):  $\$0.0264/\text{GB} \times 1\text{TB} = \mathbf{\$26.40/\text{TB/Month}}$ . So it's cheaper?
- Metered (Flex) - Outbound Transfer:  $\$0.12/\text{GB}$
- In case of a Restore 1TB:  $\$0.12 \times 1\text{TB} = \mathbf{\$120.00!}$ 
  - 4 month of Non-Metered...
  - In the other hand,  $\$6.60 \times 5\text{months} = \mathbf{\$33.00}$



# ODBCS: Additional Notes...

- Patch 18339044: CANNOT DO BACKUPS WITH ORACLE PUBLIC CLOUD SBT LIBRARY IN STANDARD EDITION
- For additional trace details (ADR): “\_OPC\_TRACE\_LEVEL=100”
- Documented parameters can be included to config file:
  - OPC\_PFILE
  - OPC\_PROXY
  - OPC\_CONTAINER
  - OPC\_CHUNK\_SIZE
- Non-Documented:



```
strings $ORACLE_HOME/lib/libopc.so | grep ^_OPC_
```

_OPC_ALLOCBUF_DISABLE	_OPC_RUN_CLEANER	_OPC_AUTH_SCHEME
_OPC_ACCESSLOG_RETENTION_TIME	_OPC_ACCESSLOG_CLEANER	_OPC_LOG_BUCKET
_OPC_SEND_BUF_SIZE	_OPC_ACCESSLOG	_OPC_REDIRECT
_OPC_RECV_BUF_SIZE	_OPC_CONNECT_TIMEOUT	_OPC_BUFFER_WRITE
_OPC_SDU_SIZE	_OPC_RESPONSE_TIMEOUT	_OPC_BUFFER_READ
_OPC_TDU_SIZE	_OPC_SEND_TIMEOUT	_OPC_USE_IPV6
_OPC_REUSE_CONNECTION	_OPC_RETRY_WAIT_TIME	_OPC_NO_SSL
_OPC_SESSION_RETENTION_TIME	_OPC_UPLOAD_DELAY	_OPC_VALIDATE_CERT
_OPC_CHECKER_RETENTION_TIME	_OPC_EVENT	
_OPC_PURGE_LIMIT	_OPC_TRACE_LEVEL	
_OPC_CLEANER	_OPC_VALIDATE_CHUNK	
_OPC_CLEANER_RETENTION_TIME	_OPC_100_CONTINUE	
	_OPC_DEFERRED_DELETE	



# Off-Site Backup Solutions: Pros x Cons

Item	D2T	D2D2T	ODBS
Supports Geo-localized Disasters / SOX Compliant	YES	YES	YES
Requires Physical Transportation for Backup Media	YES	YES	NO
Data Compression	YES	YES	YES
Parallel Backup	Driver	YES	YES / <a href="#">Upload Link</a>
Offsite Data Encryption Enforcement	NO	NO	YES
VTL Solution (Third-Party)	YES	YES	NO
Offsite Backup Replication	NO	NO	TRIPLE
Physical Failure Risk	YES	YES	NO
Adoption Cost	HIGH	HIGH	LOW
Backup Time	Medium	LOW	Relative
Recovery Time Objective (RTO)	HIGH	HIGH	<a href="#">DBSize/Download Link</a>
Recovery Point Objective (RPO)	HIGH	HIGH	LOW
Test of Backup Offsite	COMPLEX	COMPLEX	SIMPLE
Periodical Backup Hardware Upgrade	YES	YES	NO
Third-Party Software License	YES	YES	NO
Hardware Utilization Cost	TOTAL COST	TOTAL COST	PAY-AS-YOU-GO
Solution Elasticity Cost	HIGH	HIGH	LOW
Time for Solution Elasticity	HIGH	HIGH	IMMEDIATE

# ODBCS: Let's talk about Strategy...

- *"Oracle Database Backup Cloud Service complements your existing backup strategy by providing an off-site storage location in the cloud."*
- What is the Database Size? Whats is the Link Size?
  - 1Gb/s = 0.125 GB/s; 100GB (none) = 13 minutes; 1TB = 2.2 hours.  
100GB (basic) = 4.5 minutes; 1TB = 45 minutes.  
100GB (high\*) = 1.5 minutes; 1TB = 15 minutes.
- (Legatti)
- Whats's the actual Backup Strategy? What's the maintenance window for the DB?
  - A monthly cold backup can be taken?
- Potential to speedup...
  - Compression, Block Change Tracking File, QoS (dedicated interface), Internet Link.



# ODBCS: Let's talk about Strategy...

- Backup from Data Guard
  - With or without sync interruption. With or without lag...
  - Primary all on not-impacted.

- Backup to Cloud a Backup Set from Disk

```
RMAN> BACKUP AS COMPRESSED BACKUPSET DATABASE PLUS ARCHIVELOG; -- DISK
RMAN> BACKUP BACKUPSET <previous backupset>; -- CLOUD
```

- Backup to Cloud a Image Copy in Disk

```
RMAN> BACKUP AS COPY DATABASE TAG "MONTHLY_BACKUP";
RMAN> BACKUP DEVICE TYPE sbt TAG "MONTHLY_CLOUD" COPY OF DATABASE;
```

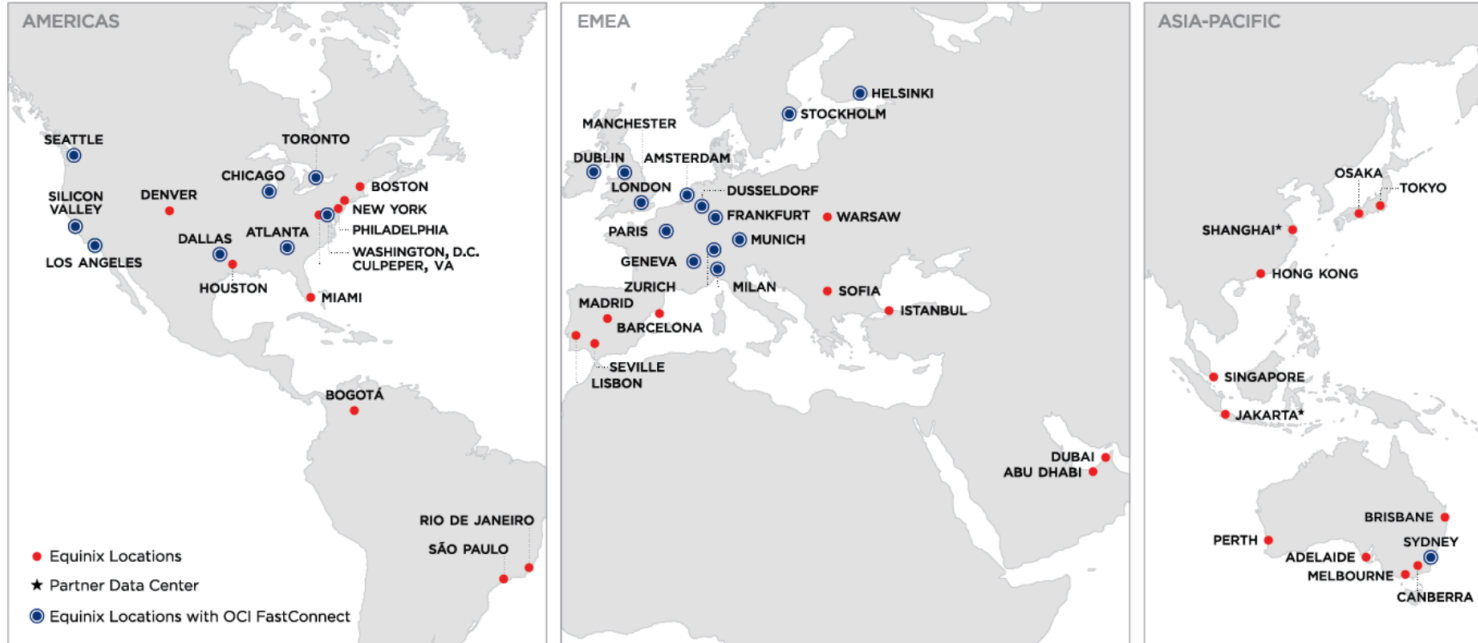
- Duplexed Backups

```
RMAN> RUN {
ALLOCATE CHANNEL c1 DEVICE TYPE DISK;
ALLOCATE CHANNEL c2 DEVICE TYPE SBT;
BACKUP CHANNEL c1 DATABASE PLUS ARCHIVELOG TAG LOCAL_COPY;
BACKUP CHANNEL c2 DATABASE PLUS ARCHIVELOG TAG CLOUD_COPY;
RELEASE CHANNEL c1;
RELEASE CHANNEL c2;
}
```



# ODBCS: Colocation on Cloud Partners

## Oracle Cloud via Equinix



# ODBCS: Conclusion...

- **ODBS for On-Premise Databases: Integrated** and **complementary** solution for **offsite** backup with **low adoption cost**, **elasticity** and **pay-as-you-go** model, which **security** is protocol guarantee through **encryption key** away from backup files, with **automated replication** and total **transparency** for existent scripts and processes.
- Attention to contract model (Metered x Non-Metered).
- Attention to possible bottlenecks and alternatives: Physical and logical components and features.

# ODBCS: Conclusion...



LecID: 501

# THANK YOU



@matheusdba



[linkedin.com/in/matheusboesing/](https://www.linkedin.com/in/matheusboesing/)



[boesing@pythian.com](mailto:boesing@pythian.com)