

ORACLE DATABASE CLOUD MIGRATION

Data Guard Cirrus Migrate Cloud



Oracle Database Cloud Migration: Data Guard vs. Cirrus Migrate Cloud About House of Brick

house of brick

At House of Brick, we are your trusted partner in navigating Oracle audit risks safely. With a track record of excellence and a commitment to client success, we specialize in providing comprehensive solutions for license assessment, compliance, and audit defense, all powered by OpsCompass™.

- **300+ Audits Defended:** We have successfully defended over 300 audits, ensuring our clients' Oracle licensing compliance and peace of mind.
- **\$4.2 Billion+ Saved in Oracle Licenses:** Our expertise and strategic approach have saved our clients billions of dollars in Oracle licensing costs.
- 2,500+ Clients Worldwide: With a global presence and a vast client base of over 2,500
 organizations, House of Brick is a recognized leader in software licensing risk assessment and audit
 defense.

House of Brick delivers world-class solutions that help our clients manage risk and achieve a higher return on investment from their enterprise database, application, and cloud investments. Our deep expertise in Oracle licensing issues sets us apart as a trusted advisor in the industry.

We provide cutting-edge software innovation and industry-leading consulting experience to help you navigate the most challenging cloud migration and operational challenges. With House of Brick as your partner, you can confidently embrace innovation and stay ahead in a rapidly evolving landscape

For more information visit <u>www.houseofbrick.com</u>.



Oracle Database Cloud Migration: Data Guard vs. Cirrus Migrate Cloud Executive Summary

Migration to the public cloud has been gaining momentum for years. The appeal is obvious – let somebody else manage the data center and provide redundant power, networks, and physical infrastructure. This allows companies to focus on managing business, rather than servers and storage. The challenge for these companies is being able to seamlessly move their workloads to the cloud without taking on additional costs or materially impacting their business operations.

The Licensing Problem

As with any hardware migration, we must pay attention to licensing. Installing software on new hardware usually carries a licensing obligation along with it. Oracle software certainly falls into this category. And, by the way, Oracle software is VERY expensive. The Oracle agreement is clear on how to count database licenses. According to the <u>Licensing Definitions and Rules</u>:

"Processor: shall be defined as all processors where the Oracle Programs are installed and/or running. Programs licensed on a processor basis may be accessed by Your internal users (including agents and contractors) and by Your third-party users. The number of required licenses shall be determined by multiplying the total number of cores of the processor by a core processor licensing factor specified on the Oracle Processor Core Factor Table which can be accessed at http://oracle.com/contracts. ..."

Oracle's policy for counting licenses is based on whether it is installed, regardless of the running state of the database. Our clients frequently ask if there is any provision in the Oracle agreement that allows for a dual-install state during a migration. The answer is no. There is no contractual provision for being dual installed during a migration. Once you start deploying Oracle software for a migration, you are on the hook for licensing. Additionally, it is difficult to de-support a subset of licenses, which means you could be required to pay for ongoing support fees.

Exploring the Database Migration Options

Organizations want to migrate their block storage data into the cloud without incurring additional and expensive licensing obligations. When it's time to cutover, they decommission the old environment and activate the cloud environment, all without purchasing unneeded licenses.

In this whitepaper, we will examine the common and lowest cost Oracle-based migration tool, Data Guard, and Cirrus Migrate Cloud from leading block data mobility provider Cirrus Data Solutions. We will also examine the configuration and operating models of each solution, as well as the costs.

Oracle Database administrators (DBAs) typically lean toward Oracle tools to manage and migrate Oracle databases. The standard answer to migration tooling for Oracle is Data Guard or GoldenGate. However, many DBAs don't consider the licensing impact of these decisions and are likely unaware of alternative data migration solutions.

Data Guard requires that the target environment be licensed as soon as the Oracle software is installed. This license remains in use while the source and target databases are staying in sync. The licensing liability is eliminated once the source database is decommissioned and the Oracle software is uninstalled, but this process may take weeks or months.

Additionally, Data Guard requires the more expensive Oracle Enterprise Edition license. There is no Data Guard solution for Standard Edition.



Oracle Database Cloud Migration: Data Guard vs. Cirrus Migrate Cloud Data Guard Migration

Oracle Data Guard performs data replication by bundling multiple database services together into a tidy package. The first step is to clone the source database, usually with Recovery Manager (RMAN). Once the database is cloned, ongoing replication is managed with the redo log mechanism. Block changes are written to online redo logs, and those changes are then transferred to the standby database via Transparent Network Substrate (TNS). These changes are then applied based on the Data Guard configuration. Setting up Data Guard is fairly straightforward but does involve significant configuration on both the primary and standby databases. See <u>Appendix A</u> for the Data Guard configuration used in this white paper.

We have encountered confusion from some of our clients that misunderstand the distinction between Data Guard and Active Data Guard. Data Guard is a product that is included with Enterprise Edition at no additional cost. However, when Data Guard is configured for a data migration, Oracle Enterprise Edition licenses are required for all databases involved. <u>The Oracle technology price list</u> shows Oracle Database Enterprise Edition with a list price of \$47,500 per processor license.

While this whitepaper is focused on Data Guard, it is important to note that Active Data Guard is a separately licensed feature of Enterprise Edition. It allows the standby database to be opened as readonly with the continued apply of redo logs to keep the standby database current with the primary database. Active Data Guard has a list price of \$11,500 per processor license. For data migrations, traditional Data Guard is typically used as it does not require additional feature licenses.

GoldenGate Discussion

GoldenGate is a data replication tool from Oracle that uses a different mechanism for data replication than Data Guard. GoldenGate is a logical replication tool. Instead of sending block level changes to the remote database, GoldenGate mines the redo logs for inserts, updates and deletes. It then transforms and sends those changes to the destination database and applies the data manipulation language (DML). GoldenGate has some advantages over block-level replication tools (such as Data Guard) in certain situations – for example, if the storage is being migrated to a different hardware platform. In this cross-platform scenario a logical replication tool makes a lot of sense. GoldenGate can also be used as an extract, transform, and load (ETL) tool to send data to a warehouse. If a subset of tables in a database need to sent and transformed, GoldenGate can be used as the ETL.

For a like-platform data center migration, a logical replication tool does not make sense. Many of our clients want to use GoldenGate to perform a database migration simply because it is the tool they are familiar with. If there are plenty of GoldenGate shelf licenses, so be it, but block level replication is a better choice for database migrations.

GoldenGate is also a separately licensed feature, similar to Active Data Guard. GoldenGate has a list price of \$17,500 per processor license and must be licensed on both the source and destination databases.

Data Guard License Cost Summary

Below is a summary of the tools reviewed, what is required for the solution, and list prices. For the following table the database costs for a migration are listed per processor license. Database Features, per processor license



- Partitioning \$11,500
- Advanced Compression \$11,500
- Advanced Security \$15,000
- Active Data Guard \$11,500
- Golden Gate \$17,500

Database Packs, per processor license

- Diagnostics Pack \$5,000
- Tuning Pack \$7,500

Active Data Guard and GoldenGate each carr	v an additional feature license as well
Active Data Guard and GoldenGate each can	y an additional reactive license as well.

Solution	Database EE	Database Features	Database Packs	Technical Support	Solution Cost
Data Guard	\$47,500	\$38,000	\$12,500	\$21,560	\$119,560/ processor license
Active Data Guard	\$47,500	\$49,500	\$12,500	\$24,090	\$133,590/ processor license
GoldenGate	\$47,500	\$55,500	\$12,500	\$25,410	\$140,910/ processor license
Cirrus Migrate Cloud	N/A	N/A	List Price \$270/TB	N/A	\$270/TB

Performance Testing

In addition to a review of the costs, we also compared the performance of the solutions reviewed.

Data Guard Migration Test

For the Data Guard test, we started with a modest 200 GB source database. This database was used for both the Data Guard and Cirrus Migrate Cloud tests. The test environment had limited bandwidth outside of our data center, so the test results will reflect that. Your source data size and bandwidth limitations will surely be different, but the test result here can be interpolated to your specific situation.

<u>HammerDB</u> was used against the source database to build the initial application schema and to provide application load during the tests.

Source Intel X86:

4 vCPUS 32 GB Memory 2 x 200 GB data volumes RHEL 7.9 Oracle 19c Enterprise Edition Database Features - Partitioning, Advanced Security, Advanced Compression, Diagnostics and Tuning Packs



Destination:

AWS r5.xlarge 4 vCPUs 32 GB Memory 2 x 200 GB EBS data volumes RHEL 7.9 Oracle 19c Enterprise Edition Database Features - Partitioning, Advanced Security, Advanced Compression, Diagnostics and Tuning Packs

The high-level steps for the Data Guard migration test are as follows:

- Prep and install Oracle software on the destination (AWS) server
- Configure Data Guard on the source and destination servers
- Duplicate the source database to the destination server using RMAN
- Start Data Guard managed recovery to replicate data changes
- When ready, stop the application and perform failover from the primary database to Data Guard database
- · Start the application in AWS and perform necessary regression testing
- Decommission the Oracle database and software on the source server

During the test, HammerDB was running a load against the primary database. The results of the test are as follows:

RMAN duplicate runtime - 4 hours 20 minutes

RMAN Logfile Output

```
The Oracle base has been set to /opt/oracle
Starting duplicate Mon Jul 3 14:58:24 EDT 2023
Recovery Manager: Release 19.0.0.0.0 - Production on Mon Jul 3 14:58:24
2023
Version 19.3.0.0.0
Copyright (c) 1982, 2019, Oracle and/or its affiliates. All rights
reserved.
connected to target database: ORCL (DBID=1666580067)
connected to auxiliary database: ORCL (not mounted)
RMAN>
RMAN> 2> 3> 4> 5> 6> 7> 8> 9> 10> 11>
using target database control file instead of recovery catalog
allocated channel: d1
channel d1: SID=20 device type=DISK
RMAN>
Recovery Manager complete.
Finished duplicate Mon Jul 3 19:18:18 EDT 2023
```





Failover Steps

•

7

Once the initial RMAN clone is complete, Data Guard keeps the standby database in sync through the redo log mechanism in Oracle. As changes are made to the primary database, changes are written to the online redo logs. The changes are then sent to standby redo logs on the standby database. Once the online log is filled, the primary and standby databases both archive their respective logs to archived logs. Changes are applied to the standby database based on the Data Guard configuration.

This state of data replication can be maintained indefinitely. Data Guard is, after all, frequently used as a disaster recovery (DR) tool. When ready, the database can be failed over to the standby.

The steps for failover are as follows:

- Stop the application at the primary data center
- Quiesce the primary database
- Cancel managed recovery of the standby database
- Run the final log apply command on the standby database
- Activate the standby database
- Shutdown the primary database
- Start and test the application in AWS

Once the application testing is complete, the former primary database can be decommissioned, along with the Oracle software. At this point, the double licensing obligation is complete and only the AWS environment would need to be licensed.

Data Guard Migration Cost

As stated earlier, once the Oracle software is installed on the destination environment there is a license liability. Assuming the <u>Oracle Cloud Licensing Policy</u> is used for the AWS environment, the following licensing would be required for this test migration.

Product	List Price	Number of Licenses	License Cost	Support Cost	Total Cost
Database EE	\$47,500	2	\$95,000	\$20,900	\$115,900
Partitioning	\$11,500	2	\$23,000	\$5,060	\$28,060
Advanced Compression	\$11,500	2	\$23,000	\$5,060	\$28,060
Diagnostics Pack	\$7,500	2	\$15,000	\$3,300	\$18,300
Tuning Pack	\$5,000	2	\$10,000	\$2,200	\$12,200
Total			\$196,000	\$43,120	\$239,120

As you can see, even a small migration environment can have quite a large licensing liability. Extrapolate this out to a large enterprise that is moving to the cloud and the license cost will get ominous quickly.

Conclusion

Oracle Data Guard is a tried-and-true method for performing like-platform migrations for Oracle databases. The data replication mechanism uses Oracle technology, so DBAs have the ability to control the database clone and replication management.

The biggest risk to using Data Guard for migrations is the significant cost of licensing the target environment. But, keep in mind that Data Guard also requires significantly more effort to configure and manage.

Oracle Database Cloud Migration: Data Guard vs. Cirrus Migrate Cloud Cirrus Migrate Cloud

The leader in block storage data mobility, Cirrus Data offers a migrate-as-a-service solution, Cirrus Migrate Cloud[™]. The patented solution offers a differentiated approach to block-storage migration that does not require the purchase of additional Oracle licenses.

Cirrus Data uses highly efficient, patented software for Oracle database migrations. Instead of using Oracle Database tooling to perform a file level clone of the database, Cirrus Data replicates the entire block device. The company's migration-as-a-service solution, Cirrus Migrate Cloud, includes compression and de-zeroing functionality to make the data replication process more efficient. Once the initial sync is complete, changed blocks are monitored and replicated to the destination, allowing you to keep your applications up while replication continues.



No additional Oracle licensing is required with Cirrus Migrate Cloud because the Oracle software is not installed or running during the data replication phase. Once you are ready to cutover to the cloud, the source environment can be quickly taken offline and the Oracle software uninstalled. At this point the destination database can be brought up and activated. The two environments never have Oracle software installed simultaneously.

The configuration for Cirrus Migrate Cloud is straightforward. See Appendix B for example screen shots of the configuration.

- Ensure there is network connectivity between the source and destination hosts
- Identify the block devices supporting the source database
- Configure storage devices on the destination hosts to match the source
- Connect to your Cirrus Data Cloud CMC account and configure the following
- Migration hosts (install CMC agent on both source and destination hosts)
- Source and destination host connections
- Migration session

Note: Cirrus Data Cloud has integrations available for all leading public clouds, virtual cloud arrays, and on-premises storage providers. These integrations automate manual tasks such as determining exact storage configurations between the source and destination storage.

Once the configuration is finished and connectivity is established, you can start the initial sync. Once the initial sync is complete, you will receive confirmation from the application.

e 4 C 2 Reprintente Otomorie	O A ex trapa (classi dimedire constraine)	nçilişa 11464-cilali -4cin-3018-esiPhilabeeti Inigrationspensions/Phah	164-1216-8428-6685-8545	ente de la d
CírrusData 🗅				🧑 Jatt Storacak 🗸 🗸
My Projects	Cirrus Migrat	e Cloud Session		
POC-House-of-Brick	Synchronizing	Estimated Time Remaining: 6 seconds	Session Configuration	
Overview		Migration Rate	Volumes.	
96 Data Migration	\cap	23-49 MBN 10-4 HT	Description	No Description for this session
 Migration Hosts H2H Connections 	(100%)	Transfer Rate	Preioct	PCC House of Brink
🦕 Migration Sessions	\bigcirc	Alexandra Convert Alexandra Alexandra Alexandra Alexandra Statistica	Hest	9-172-31-28-212
impgrations	199.93 GIB / 200.07 GIB		Created	2022-07-08 12:00:21 by Jeff Stanaces
Peports	and and	The Area Sector A Sector Data and the Restored	Current IQOS	
414 Settings	Initial Synchronization	The cara rates (cost (toz co was restated)	Level	- Marca M
🔿 Hels Center	Total Sync Time 1 hour 34 minutes 38 seconds	Reise 200.00 Total Changed 69.38	Re-syns Internal	1440 Minutes
fail Process Failers Ballie APT 8 2023 Circus Safa Taislations Feb.		Data: 08 Data: MB Current Changed Data: 69.38 MB		

For our test the Cirrus Migrate Cloud initial sync took 1 hour 58 minutes and consumed 14 MB/sec of network bandwidth. The Cirrus Data initial sync went considerably faster than the RMAN duplicate as Cirrus Migrate Cloud employs data compression during the sync.





For production systems, the RMAN copy process may impact production I/O and network bandwidth. RMAN does not achieve any higher throughput during the time when the system is not busy.

If more network bandwidth is available, the Cirrus Migrate Cloud copying process can go even faster relative to the wire speed, but the RMAN copy process will be limited by system resources on the host.

Cirrus Migrate Cloud Failover Steps

Oracle Data Guard uses Oracle Database technologies to perform the database migration, so the steps to failover the database are all performed by the DBA using SQL*Plus commands. The Cirrus Migrate Cloud failover uses a different methodology. Since we are performing device-level block replication with Cirrus Migrate Cloud, we have to ensure the database is in a consistent state prior to performing the final Cirrus Migrate Cloud sync.

- Stop the application at the primary data center
- Shutdown the source database and decommission the Oracle software to free up the licenses
- Perform a final Cirrus Migrate Cloud sync
- Stop the Cirrus Migrate Cloud migration session
- Start the destination database
- Start the application in AWS and perform necessary regression testing

These migration steps are very simple and require no additional licensing because the software is not installed in both locations simultaneously. In the event that the regression testing fails, the application can be failed back to the primary data center by reversing the steps in the failover plan.

Cirrus Migrate Cloud Cost

Cirrus Migrate Cloud is priced per terabyte (TB) of replicated data. The Cirrus Migrate Cloud list price for one TB of replicated data is \$270. The test environment used in this white paper contained 400 GB

of data volumes. So, the entire cost of migrating the data for this test was \$270, with 600 GB of data to spare.

Compare this to the licensing for Oracle Data Guard. The total licensing cost for the AWS Data Guard instance used in this test is \$239,000 at list price. Additionally, these perpetual licenses would require \$43,000 for each additional year for software update license and support. Oracle Data Guard is a staggering cost for a small migration. Once the migration is complete and the source environment is decommissioned, the licensing requirements go back down, creating shelf licenses that still require support payments. Oracle makes it very difficult to de-support a subset of licenses, so you may be on the hook to continue paying support on your shelf licenses.

The Cirrus Migrate Cloud AWS environment does not require Oracle licenses during the data replication phase because there is no Oracle software "installed and/or running." Since Cirrus Migrate Cloud replicates low-level disk devices, the Oracle software does not need to be available. If the source environment is decommissioned before activating the target database in AWS, then there is no dual-install scenario for the migration.

Conclusion

Both Data Guard and Cirrus Data are capable of replicating data. Data Guard uses Oracle Database technologies, so your DBAs are in control of the migration. In contrast, Cirrus Data replicates data volumes with its automated migration-as-a-service solution, Cirrus Migrate Cloud, which does not require much interaction from your DBA team.

The configuration for Data Guard is straight forward but time consuming with tedious details. The manual processes put additional strain on DBA resources. In contrast, the Cirrus Migrate Cloud configuration is very simple and intuitive. The Cirrus Data software is installed on the endpoints with one command. The migration configuration for Cirrus Data is all GUI driven providing a very simple and straight forward way of setting up the migration.

The biggest concern with using Data Guard for database migrations is Oracle licensing. Data Guard not only requires the purchase of new licenses but those licenses have long term support costs associated with them. Once the licenses are purchased, the Oracle agreement makes it difficult to stop paying support.

Using Cirrus Data for cloud migration makes sense for a lot of reasons.

- Cirrus Data is easier and less time consuming to configure
- Cirrus Data uses compression and de-zeroing for data replication
- Cirrus Data requires much less time from your DBA team
- Cirrus Data eliminates negotiating and managing new licenses from Oracle
- · Cirrus Data is a fraction of the cost of new Oracle licenses

Solution	Migration Time	New Oracle License	New Oracle Annual Support	Compression	De-zeroing	Cost
Oracle Data Guard	4 hours 20 minutes	\$196,000	\$43,000/year ongoing	No	Νο	\$239,000/ first year
Cirrus Migrate Cloud	1 Hour and 58 minutes	N/A	N/A	Yes	Yes	\$270 / one-time

Data Migration Solution Comparison

Oracle Database Cloud Migration: Data Guard vs. Cirrus Migrate Cloud Appendix A: Data Guard Configuration

The steps outlined here will enable data replication from the primary to the standby database using Data Guard.

TNS Configuration

Create tnsnames.ora entries on both servers.

```
orcl =
  (DESCRIPTION =
    (ADDRESS_LIST =
      (ADDRESS = (PROTOCOL = TCP)(HOST = linol7-121-e1)(PORT = 1521))
   )
    (CONNECT_DATA =
      (SERVICE_NAME = orcl)
           (UR = A)
   )
  )
orclaws =
  (DESCRIPTION =
    (ADDRESS_LIST =
      (ADDRESS = (PROTOCOL = TCP)(HOST = ec2-18-222-15-85.us-east-2.
compute.amazonaws.com)(PORT = 1521))
   )
    (CONNECT_DATA =
      (SERVICE_NAME = orcl)
           (UR = A)
   )
  )
Create a listener entry on both the primary and standby servers.
LISTENER =
  (DESCRIPTION_LIST =
    (DESCRIPTION =
      (ADDRESS = (PROTOCOL = TCP)(HOST = linol7-122-e2)(PORT = 1521))
      (ADDRESS = (PROTOCOL = IPC)(KEY = EXTPROC1521))
   )
  )
SID_LIST_LISTENER =
  (SID_LIST =
   (SID_DESC =
      (ORACLE_HOME = /opt/oracle/193)
      (SID_NAME = orcl)
   )
  )
```



Configure Data Guard on the Standby Server

Step one is to get the standby database to a nomount state.

Install the Oracle software on the standby database server.

Create all of the necessary directories for the standby database.

Copy the primary database password file to the standby.

Create a pfile on the primary node and copy it to the standby node.

```
create spfile='/opt/oracle/193/dbs/spfileorcl.ora' from pfile='/home/oracle/
initorcl.ora';
```

On the standby database, make the following changes to the pfile:

```
alter system set db_unique_name='orclaws' scope=spfile;
alter system set log_archive_dest='' scope=both;
alter system set fal_client='orclaws' scope=both;
alter system set fal_server='orcl' scope=both;
alter system set standby_file_management='AUTO' scope=both;
alter system set log_archive_config='dg_config=(orcl,orclaws)' scope=both;
alter system set log_archive_dest_1='LOCATION=/mnt/disk2/fra/orcl/'
scope=both;
alter system set log_archive_dest_2='service=orcl ASYNC valid_for=(ONLINE_
LOGFILE,PRIMARY_ROLE) db_unique_name=orcl' scope=both;
alter system set dg_broker_start=FALSE scope=both;
```

Start the standby database in nomount mode.

Configure Data Guard on the Primary Server

Ensure that the primary database is in archivelog mode.

Configure spfile on the primary node.

```
alter system set log_archive_dest='' scope=both;
alter system set log_archive_dest_1='LOCATION=/mnt/disk2/fra/orcl'
scope=both;
alter system switch logfile;
alter system set fal_client='orcl' scope=both;
alter system set fal_server='orclaws' scope=both;
alter system set standby_file_management='AUTO' scope=both;
alter system set log_archive_config='dg_config=(orcl,orclaws)' scope=both;
alter system set log_archive_dest_state_2=DEFER scope=both;
alter system set log_archive_dest_2='service=orclaws ASYNC valid_
for=(ONLINE_LOGFILE,PRIMARY_ROLE) db_unique_name=orclaws';
alter system set dg_broker_start=FALSE scope=both;
```



Perform RMAN duplicate

Run rman duplicate from the source node.

```
#!/bin/bash
## nohup ./rman_dup.sh > rman_dup.log 2>&1 &
****
export ORAENV_ASK=NO
export ORACLE_SID=orcl
. oraenv
echo -e "Starting duplicate `date`\n"
$ORACLE_HOME/bin/rman target / auxiliary sys/<PW>@orclaws <<EOF</pre>
RUN {
allocate channel d1 device type disk;
allocate channel d2 device type disk;
allocate channel d3 device type disk;
allocate channel d4 device type disk;
allocate auxiliary channel a1 device type disk;
allocate auxiliary channel a2 device type disk;
allocate auxiliary channel a3 device type disk;
allocate auxiliary channel a4 device type disk;
duplicate target database for standby from active database dorecover
nofilenamecheck;
}
EOF
echo -e "\nFinished duplicate `date`\n"
```

After the clone is complete, drop and recreate standby and regular redo logs on the standby database.

```
alter system set standby_file_management=manual scope=both;
alter database drop logfile group 1;
alter database drop logfile group 2;
alter database drop logfile group 3;
alter database drop standby logfile group 4;
alter database drop standby logfile group 5;
alter database drop standby logfile group 6;
```

Note: The active redo logfile group will error out in the above steps even though it's not in use for a standby db, must perform the following for the active redo log group.

```
alter database rename file '/mnt/disk2/fra/ORCLAWS/onlinelog/o1_mf_1_
l98q41or_.log' to '/mnt/disk1/oradata/orcl/redo01.log';
alter database clear logfile group 1;
```

This will rename the redo log file in the controlfile and then remove the old file and instantiate the new one.

```
alter database add logfile THREAD 1 group 1 ('/mnt/disk1/oradata/orcl/
redo01.log') SIZE 2147483648;
alter database add logfile THREAD 1 group 2 ('/mnt/disk1/oradata/orcl/
redo02.log') SIZE 2147483648;
alter database add logfile THREAD 1 group 3 ('/mnt/disk1/oradata/orcl/
redo03.log') SIZE 2147483648;
alter database add standby logfile THREAD 1 group 4 ('/mnt/disk1/oradata/
orcl/standby_redo04.log') SIZE 2147483648;
alter database add standby logfile THREAD 1 group 5 ('/mnt/disk1/oradata/
orcl/standby_redo05.log') SIZE 2147483648;
alter database add standby logfile THREAD 1 group 6 ('/mnt/disk1/oradata/
orcl/standby_redo05.log') SIZE 2147483648;
alter database add standby logfile THREAD 1 group 6 ('/mnt/disk1/oradata/
orcl/standby_redo06.log') SIZE 2147483648;
alter system set standby_file_management=auto scope=both;
```

Start managed recovery.

Primary:

alter system set log_archive_dest_state_2=ENABLE scope=both;

Standby:

```
sqlplus / as sysdba
recover managed standby database disconnect;
```

Check Data Guard status:

```
set lines 132 pages 500
col name format a30
col value format a20
col time_computed format a30
select name, value, time_computed from v$dataguard_stats;
```

Oracle Database Cloud Migration: Data Guard vs. Cirrus Migrate Cloud Appendix B: Configure Cirrus Data

Once your account is established with Cirrus Data, it is a quick and easy process to configure data replication between the source and destination hosts. Initially, no Migration Hosts exist.



Click on the "DEPLOY CIRRUS MIGRATE CLOUD" button to bring up the commands to run on the endpoints.

Run the deploy commands as root on the hosts to deploy the Cirrus Migrate Cloud software. For large data migration environments, this step can be automated to deploy across your organization.

```
[root@linol7-121-oracle1 ~]# curl get.cirrusdata.cloud/install-cmc | bash
-s -- -rgc FCDUMLEEN0DNBSZOED9G
% Total % Received % Xferd Average Speed Time Time Time
Current Dload Upload Total Spent Left
Speed
100 2622 100 2622 0 0 33146 0 --:--:----:---:---
32775
```



```
https://www.cirrusdata.com
_____
Cirrus Data Cloud Installer
_____
===
            oracle linux 7.9 (rhel) [el7]
5.4.17-2102.201.3.el7uek.x86_64
0S:
Kernel:
Arch:
             x86_64
CPU:
             Intel(R) Xeon(R) CPU E5-2630 v3 @ 2.40GHz (4 Cores)
             31 GiB
Memory:
_____
===
Checking network configurations and conditions for connecting to CMC...
cirrus migrate cloud version available: 5.7.2
requesting cirrus migrate cloud software packages...
Downloading Cirrus Migrate Cloud 100%
                                        | (41/41 MB, 31.534 MB/s)
[1s:0s]
cirrus migrate cloud installation packages downloaded
no pre-built package available. nexus source will be downloaded and
built locally: no supported installation package found for this system
configuration
new version available: 12.14.0
preparing nexus build environment...
checking if development packages already exist...
. . .
_____
galaxy-migrate - 5.7.2 is getting installed
_____
 Verifying : galaxy-migrate-5.7.2-1.el7.x86_64
1/1
Installed:
 galaxy-migrate.x86_64 0:5.7.2-1.el7
Complete!
software packages installed via yum
galaxy-migrate software packages installed
Installation Completed. You may now start cirrus migrate cloud service
using the following command:
sudo systemctl start galaxy-migrate
Checking SELinux status...
SELinux is disabled.
Starting Cirrus Cloud Migrate Services
cirrus migrate cloud service is now started
Waiting for service to be ready...
Registering to Cirrus Data Cloud: FCDUMLEEN0DNBSZ0ED9G
successfully registered to Cirrus Data Cloud
```

Run the install command on both the source and the destination hosts. Once complete, the hosts are registered with your Cirrus Data account.

Hosts I	Dep	loyed			DEPLOY CIRRU	S MIGRATE CLOU	•
Name	Version	OS	Host Environment	Connected	Check-In	Latency	Actions
6-172-01-08-012	5.7.2	▲ cracie Bour 79 (114) - 3.10.0-1100 ef7x80_04	en 145	Yes	14 seconds ago	28.08ms	:
Inol7-121- oracle1	5.7.2	∆ practie Boux 79 01148 - 5.417- 2107 2013 ethuek x80,04	G UMeare	Yos	10 seconds ago	10.02ms	:

Next, configure the host connection. For a large migration, there will likely be many source and destination hosts. You must configure which source hosts are connected to which destination hosts.

Host-to-Host Connections							
From Host	To Host	Connection Address	Connected	Latency	Actions		
		1	~				
		l					
		No Conne	ections Found				
		Get started now or visit our He	ip Center for additional informatic	n.			

Create New Connectio	on		ά×
From Host linol7-121-oracl	»	To Host lp-172-31-28-2	Connection Address ec2-18-223-228-28.us-e:
	÷		linol7-121-oracle1 will connect to ip-172-31-28-212 via this address.
			CANCEL CONNECT

lost-to-Host Connections				CREATE NEW CONNECTION	
From Host	To Host	Connection Address	Connected	Latency	Actions
ino7-121-prace1	⊕ 172-31-28-212	ec2-18-223-228-28.us-east-2.compute.amazonaws.com	Yes	22.66ms	:
			Go To Pages 0 +	• 1-1/1 K - 1	

With the host-to-host connection established, we can configure a migration session. This is where you tell CirrusData which host is the source and which is the destination, as well as choosing which source volumes should be replicated to which destination volumes.



New	Migration S	Session	¥.		
🕕 Souro	e Host - linci?-121-cracle1	🔵 Mark	tion Type —	Volume Selections	🔲 Mgration Parameters
Select the so	urce for this migration session				
Select	Name	Version	os		
0	ip-172-31-28-212	5.7.2	۰ ۵	nacie linux 7,0 0mel) - 3,10,0-1160.el/3,88,64	
	line(7-121-oracle1	5.7.2	٥	racle linux 7.9 (mei) - 5.4.17-2102.201.3.e/7uek.x88,84	
				Go Te Pege	• • • • • • • •
			•	CONTINUE	





0 10-172-31-28-212 ec2-18-22:	3-228-28.us-east-2.compute.amazonaws.com (ip-172-31-28-212)	21.15ms
	Oo To Page 1 - 1	•1(1) IC (C) (3) (3)
Select Migration Volume Type		
:		
· ·		
cMotion" can be used to move your workload without downtime	Move your boot volumes () Move your boot volume without impacting production	
	VIEW BOOT VOLUME MIGRATION OUIDE	
	Note: Review migration guide before continuing.	
	DO BACK CONTINUE	

New Migration	Session		
Source Host - Inol7-121-oracle1	Migration Type - Remote	Wulume Selections	Migration Parameters
Select Volumes to be included in this migration	n session		
Allow Migration to Smaller Volumes	0	ANTO AL	LOCATE DESTINATION VOLUMES
SELECT LVM VOLUMES AS SOURCE			
sdb (20000108)		xvdb (2000)	
(ascon) (m) (models)		86	
1dc (200.00.00)	**	xvd: (200.00	
(match) (rs) (metchat)	MACK -		• •



Enabling Auto Re-sync tells CirrusData to monitor changed blocks after the initial sync and to replicate the changes periodically. The Auto Sync interval is configurable. Cirrus Data keeps track of the changed blocks and synchronizes those blocks at the interval time.

Source Host - linol7-121-oracle1	Migration Type - Remote	Volume Selections	Migration Parameters
ustomize your migration session using t	the settings below		
l. Description			
Sealer Descripton Migrate Oracle Database Volumes			
Automatic Ro-Syn			
. Automatic Re-Synt			
r			
\$	Th .		
Ð			
Enable Auto Re-sync	Disable Auto Re-		
Enable Auto Re-sync	Disable Auto Re- syric Disabling this will allow		

The quality-of-service feature allows the user to adjust the bandwidth limitation for the environment. The data replication proceeds as fast as possible unless there is contention for the network. This keeps Cirrus Data from causing network disruptions during the data replication.



Cirrus Data performs an initial sync of the entire data volumes. Once that is complete, Cirrus Data keeps track of changed blocks and will synchronize them at the specified time interval.

CírrusData 🗅				🛞 Alf Donacek 🖌 🖌
🖪 My Projecta	Cirrus Migrate	Cloud Session		RESIDN ACTIONS
esilatat mouter PDC-House-of-Bhos	Synchronizing	Estimened Time Those 59 minutes 11	Resiles Configuratio	-
Overview	Synchronizing	Remaining seconds	Volumen	
50 Data Migration	\frown	17.1 Miles Comm	Description	Myrate Oracle Delabase Volumes
Le Migration Hosts	(0%)	18.00 MBA: Horouge	Project	POC-Meson of Brids
L Migration Sessions		1215 MOV Commit	Heat	
🕭 Integrations	899.00 MB / 400.00 GB	and Mark Deserved	Created	2023-07-27 13:30:25 to July Storages
Reports	Mgrated		Current IQOS Level	MARKA
414 Settings	Initial Synchronization	Thir Data Rate: 65,74% (591.00 MB Reduced)	Re-syne leternal	80 Minutes
Help Center	Total Sync Time 15 seconds			
Tata II Provide Parity II DOLP II APP M 2010 Direct Dark Endland Par		Base Data: 400.00 G48 Total Charged Data: 0.00 B Current Charged Data: 0.00 B		
	VOLUMES. TRADES			0



ABOUT CIRRUS DATA

Cirrus Data Solutions Inc. (CDS) is a leading provider of block data mobility technology and services. The company distributes its solutions through systems integrators, managed service providers, channel resellers, and partners, including Dell Technologies, HPE, IBM, Microsoft, AWS, Oracle Cloud, Hitachi, NetApp, Pure Storage, Infinidat, AHEAD, CDW, ConvergeOne, Logicalis, SHI, Presidio, ePlus, Insight, Computacenter, Sirius Computer Solutions, World Wide Technology, and many others. Additionally, the company's flagship mobility-as-a-service offering, Cirrus Migrate Cloud, is available on the Microsoft Azure Marketplace, Amazon Web Services (AWS) Marketplace, Google Cloud Marketplace, and Oracle Cloud Marketplace. CDS is headquartered in Syosset, New York, and has support centers in Ireland, with sales and support offices across the United States, Europe, and Asia-Pacific.

For more information, visit CDS online at <u>www.cirrusdata.com</u>.





www.houseofbrick.com | +1 877-780-7038

2022 © OpsCompass, inc. & House of Brick Technologies, Ilc.