



Oracle HA/DR with AWS FSx ONTAP

NetApp Solutions

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Automated Oracle HA/DR in AWS FSx ONTAP

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Purpose

This toolkit automates the tasks of setting up and managing a High Availability and Disaster Recovery (HA/DR) environment for Oracle database deployed in AWS cloud with FSx for ONTAP storage and EC2 compute instances.

This solution addresses the following use cases:

- Setup HA/DR target host - kernel configuration, Oracle configuration to match up with source server host.
- Setup FSx ONTAP - cluster peering, vserver peering, Oracle volumes snapmirror relationship setup from source to target.
- Backup Oracle database data via snapshot - execute off crontab
- Backup Oracle database archive log via snapshot - execute off crontab
- Run failover and recovery on HA/DR host - test and validate HA/DR environment
- Run resync after failover test - re-establish database volumes snapmirror relationship in HA/DR mode

Audience

This solution is intended for the following people:

- A DBA who set up Oracle database in AWS for high availability, data protection, and disaster recovery.
- A database solution architect who is interested in storage level Oracle HA/DR solution in the AWS cloud.
- A storage administrator who manages AWS FSx ONTAP storage that supports Oracle databases.
- An application owner who like to stand up Oracle database for HA/DR in AWS FSx/EC2 environment.

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Solution deployment

Prerequisites for deployment

Deployment requires the following prerequisites.

```
Ansible v.2.10 and higher
ONTAP collection 21.19.1
Python 3
Python libraries:
    netapp-lib
    xmltodict
    jmespath
```

```
AWS FSx storage as is available
```

```
AWS EC2 Instance
    RHEL 7/8, Oracle Linux 7/8
    Network interfaces for NFS, public (internet) and optional management
    Existing Oracle environment on source, and the equivalent Linux
    operating system at the target
```

Download the toolkit

```
git clone https://github.com/NetApp/na_ora_hadr_failover_resync.git
```

Global variables configuration

The Ansible playbooks are variable driven. An example global variable file `fsx_vars_example.yml` is included to demonstrate typical configuration. Following are key considerations:

ONTAP - retrieve FSx storage parameters using AWS FSx console for both source and target FSx clusters.

cluster name: source/destination

cluster management IP: source/destination

inter-cluster IP: source/destination

vserver name: source/destination

vserver management IP: source/destination

NFS lifs: source/destination

cluster credentials: fsxadmin and vsadmin pwd to be updated in `roles/ontap_setup/defaults/main.yml` file

Oracle database volumes - they should have been created from AWS FSx console, volume naming should follow strictly with following standard:

Oracle binary: `{{ host_name }}_bin`, generally one lun/volume

Oracle data: `{{ host_name }}_data`, can be multiple luns/volume, add additional line for each additional lun/volume in variable such as `{{ host_name }}_data_01`, `{{ host_name }}_data_02` ...

Oracle log: `{{ host_name }}_log`, can be multiple luns/volume, add additional line for each additional lun/volume in variable such as `{{ host_name }}_log_01`, `{{ host_name }}_log_02` ...

host_name: as defined in hosts file in root directory, the code is written to be specifically matched up with host name defined in host file.

Linux and DB specific global variables - keep it as is.

Enter redhat subscription if you have one, otherwise leave it black.

Host variables configuration

Host variables are defined in host_vars directory named as {{ host_name }}.yml. An example host variable file host_name.yml is included to demonstrate typical configuration. Following are key considerations:

```
Oracle - define host specific variables when deploying Oracle in
multiple hosts concurrently
  ansible_host: IP address of database server host
  log_archive_mode: enable archive log archiving (true) or not (false)
  oracle_sid: Oracle instance identifier
  pdb: Oracle in a container configuration, name pdb_name string and
number of pdbs (Oracle allows 3 pdbs free of multitenant license fee)
  listener_port: Oracle listener port, default 1521
  memory_limit: set Oracle SGA size, normally up to 75% RAM
  host_datastores_nfs: combining of all Oracle volumes (binary, data,
and log) as defined in global vars file. If multi luns/volumes, keep
exactly the same number of luns/volumes in host_var file
```

```
Linux - define host specific variables at Linux level
  hugepages_nr: set hugepage for large DB with large SGA for
performance
  swap_blocks: add swap space to EC2 instance. If swap exist, it will
be ignored.
```

DB server host file configuration

AWS EC2 instance use IP address for host naming by default. If you use different name in hosts file for Ansible, setup host naming resolution in /etc/hosts file for both source and target servers. Following is an example.

```
127.0.0.1    localhost localhost.localdomain localhost4
localhost4.localhost4
::1         localhost localhost.localdomain localhost6
localhost6.localhost6
172.30.15.96 db1
172.30.15.107 db2
```

Playbook execution - executed in sequence

1. Install Ansible controller prerequisites.

```
ansible-playbook -i hosts requirements.yml
```

```
ansible-galaxy collection install -r collections/requirements.yml  
--force
```

2. Setup target EC2 DB instance.

```
ansible-playbook -i hosts ora_dr_setup.yml -u ec2-user --private-key  
db2.pem -e @vars/fsx_vars.yml
```

3. Setup FSx ONTAP snapmirror relationship between source and target database volumes.

```
ansible-playbook -i hosts ontap_setup.yml -u ec2-user --private-key  
db2.pem -e @vars/fsx_vars.yml
```

4. Backup Oracle database data volumes via snapshot from crontab.

```
10 * * * * cd /home/admin/na_ora_hadr_failover_resync &&  
/usr/bin/ansible-playbook -i hosts ora_replication_cg.yml -u ec2-  
user --private-key db1.pem -e @vars/fsx_vars.yml >>  
logs/snap_data_`date +%Y-%m%d-%H%M%S`.log 2>&1
```

5. Backup Oracle database archive log volumes via snapshot from crontab.

```
0,20,30,40,50 * * * * cd /home/admin/na_ora_hadr_failover_resync &&  
/usr/bin/ansible-playbook -i hosts ora_replication_logs.yml -u ec2-  
user --private-key db1.pem -e @vars/fsx_vars.yml >>  
logs/snap_log_`date +%Y-%m%d-%H%M%S`.log 2>&1
```

6. Run failover and recover Oracle database on target EC2 DB instance - test and validate HA/DR configuration.

```
ansible-playbook -i hosts ora_recovery.yml -u ec2-user --private-key  
db2.pem -e @vars/fsx_vars.yml
```

7. Run resync after failover test - re-establish database volumes snapmirror relationship in replication mode.

```
ansible-playbook -i hosts ontap_ora_resync.yml -u ec2-user --private  
-key db2.pem -e @vars/fsx_vars.yml
```

Where to find additional information

To learn more about the NetApp solution automation, review the following website [NetApp Solution Automation](#)

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