DATA INTENSITY

Oracle EBS on OCI – High Availability and Disaster Recovery Configurations

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DATA INTENSITY

- 25+ Years working with Oracle technologies
  - Oracle Cloud, Multi-Cloud
  - Oracle Database Services
  - E-Business Suite
  - Cloud Migrations & Optimal Architectures
  - AI and GenAI
- Community Leader
  - Oracle ACE Program since 2013
  - Oracle ACE Director recognition in 2015
  - Quest Oracle Community Database SIG Cofounder
  - Oracle Applications Technology User Group EBS on OCI SIG co-chair
- Published author
- Speaker @ Oracle conferences and user groups

Data Intensity: Oracle Applications, AI, & Multi-Cloud

Oracle Fusion Cloud Applications
- Readiness Assessments
- Global Design
- Implementation of ERP, SCM, EPM
- Post-Implementation Support

Multi-Cloud Support
- OCI, Azure, GCP, AWS Support, Client Private Cloud
- Cloud Architecture, Migration, and Managed Services

Oracle Data Platform Mgmt.
- PaaS – Oracle 23ai, Autonomous, ExaCS, MySQL, PostgreSQL
- Middleware - OID, IAM, OAC, ODI, GGCS

Cloud Optimization
- Cost & Performance Optimization TCO Analysis of Licensing, Services and Workloads Across Platforms
- Enabling Data-Driven Decisions

Oracle ERP / EPM App Support
- EBS, JDE, PeopleSoft, Hyperion, Apex
- Tech Support: App Monitoring, Patching, Tuning, Performance Management
- Functional Support: App Config., User Transactions, Customizations, Dev
- Upgrade Projects

Oracle Software Licensing Solutions
- Annual Support Cost Optimizations
- License Compliance Assessments & Compliance Remediation Assistance
- Re-Sale of Licensing & Consumption

Database Management
- Oracle DB, MS SQL, MySQL, DB2, Mongo DB, etc.
- DB Monitoring, Patching, Tuning, Performance Management, Upgrades

AI Strategy & Execution
- Strategic Visioning & Requirements Gathering
- Expert Solution Recommendations
- Data Readiness & Proof of Value Assessment

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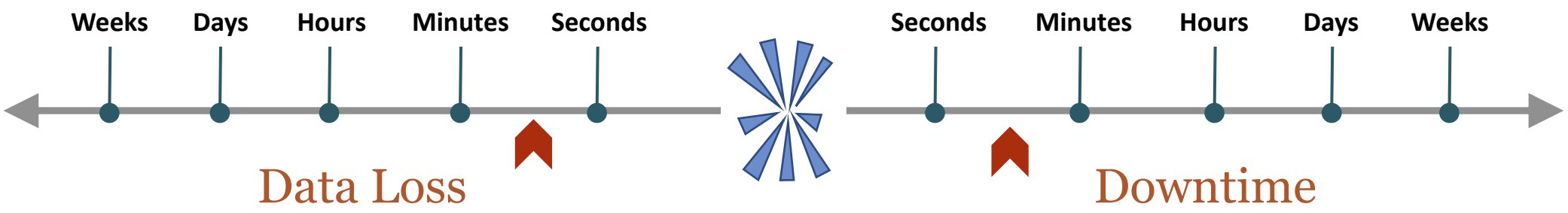
Recovery Point and Recovery Time Objectives

Recovery point and time are a function of standard OCI services.



Recovery Point Objective (RPO)

Tolerance for data loss (sec's, hours, days); determines frequency of backups and replication approaches

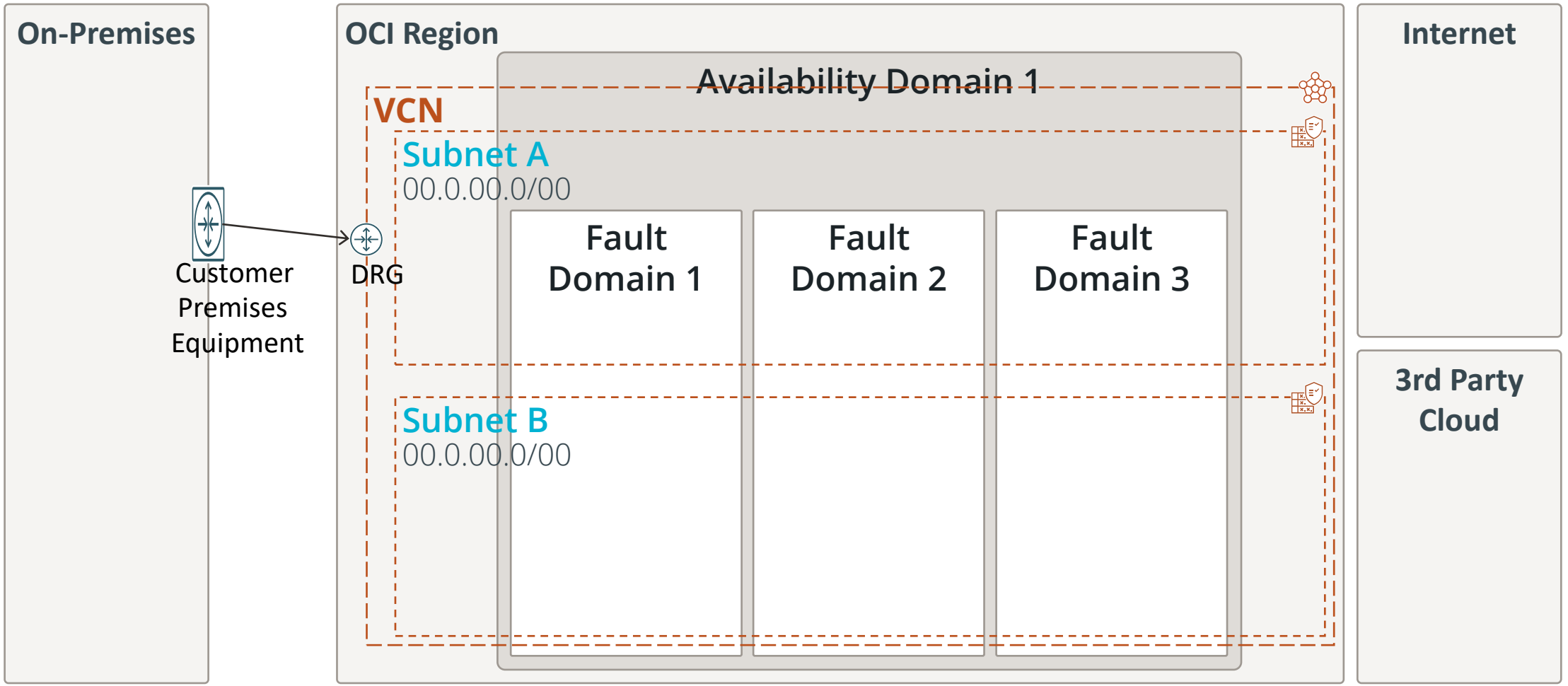
- RPO for Oracle databases is configured when Data Guard is enabled through standard OCI Oracle Database services for Autonomous DB, BaseDB, ExaCS
- RPO for compute is configured when enabling cross-region replication for block or file system

Recovery Time Objective (RTO)

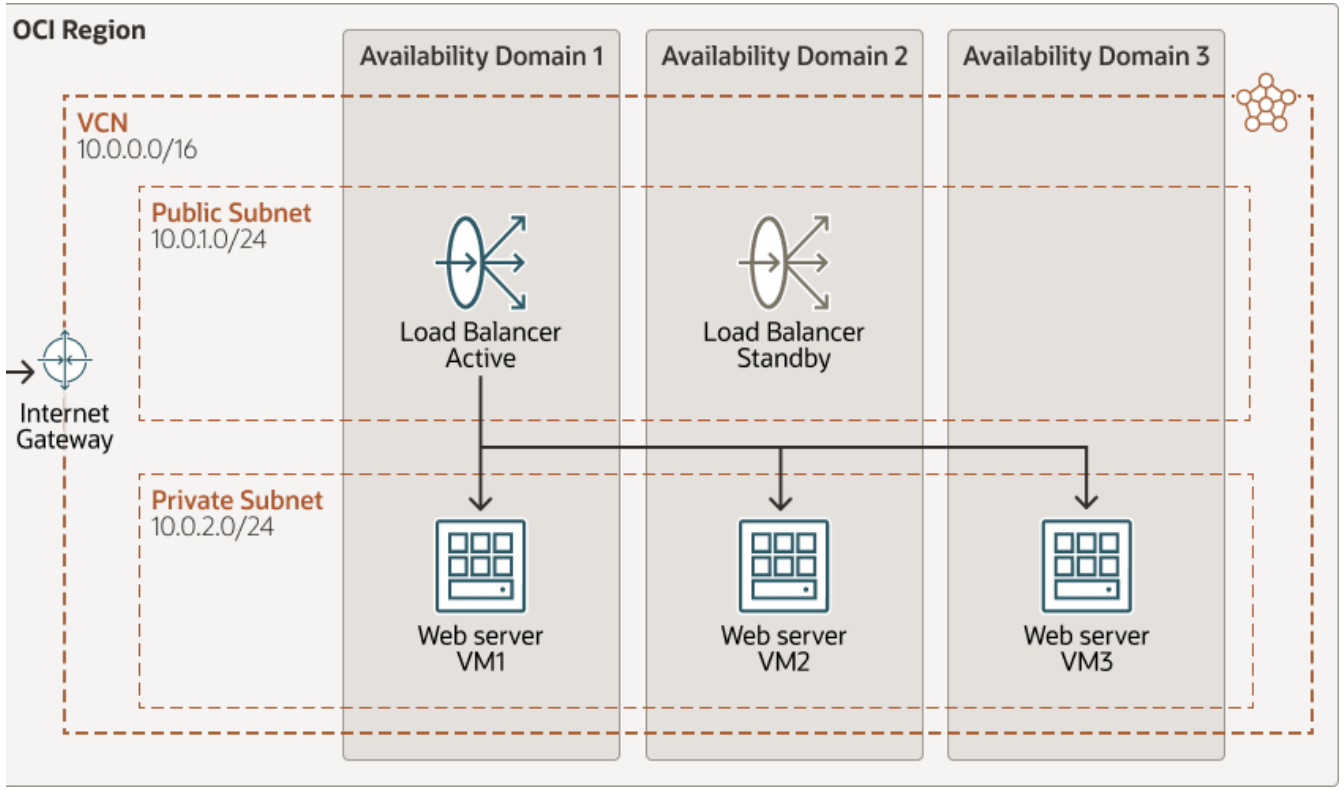
The shorter the Recovery Time Objective (RTO) the quicker you get back to business

- RTO for Oracle databases is based on how long it takes Data Guard to recover a database
- RTO for compute is based on how long it takes OCI to start virtual machines
- RTO for applications is based on how long it takes your application to start

Cloud INFRASTRUCTURE BASICS



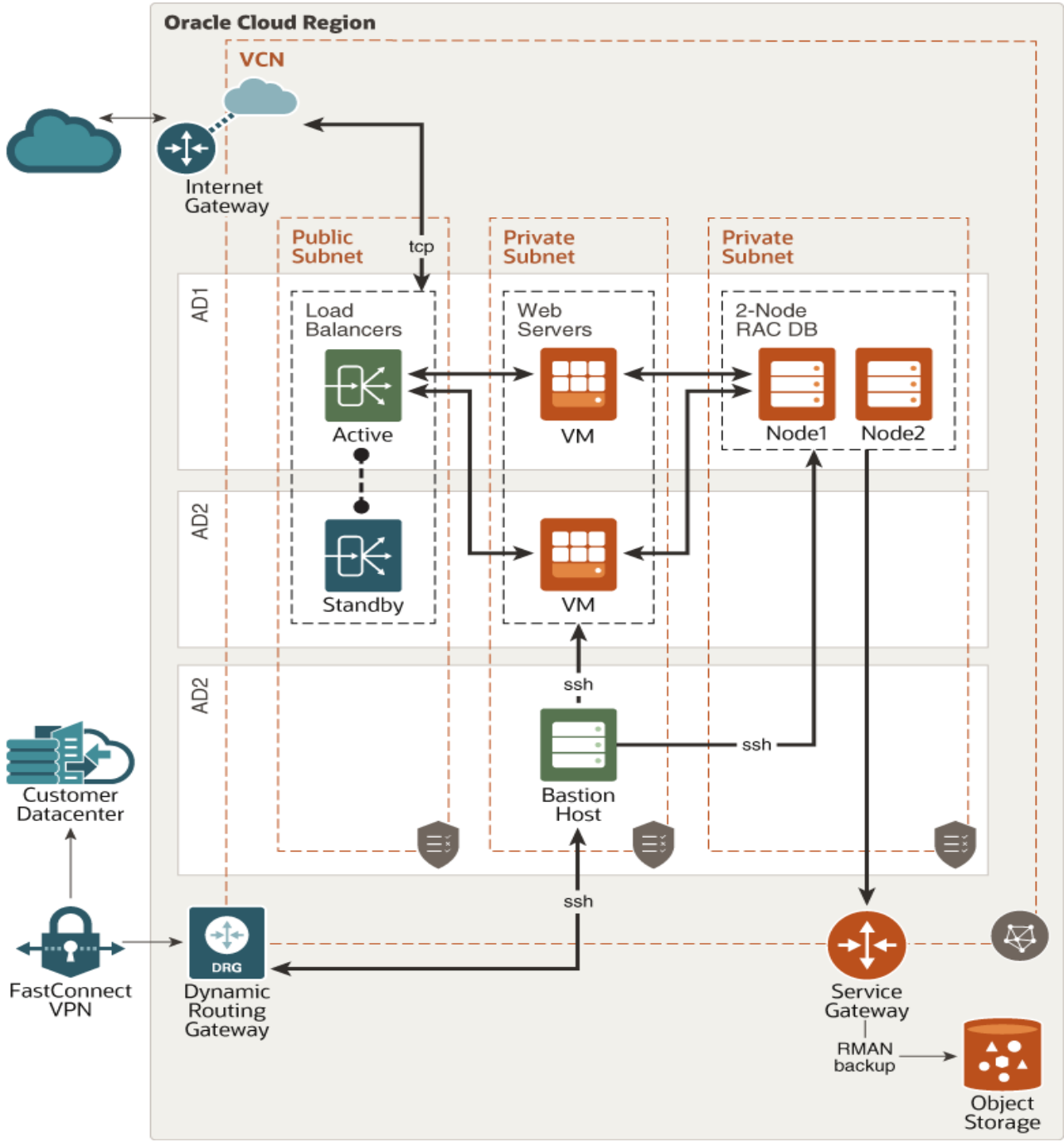
HA for Compute Instances



- Distribute Instances Across Fault Domains
  - Two or more web servers and clustered database
    - Group one web server and database node in one fault domain and the other half of each pair in another fault domain.
  - Single Web Server and Database Instance Architecture
    - Place the web server and DB server in the same Fault Domain
- Distribute Instances Across Availability Domains
- When instances are distributed across availability domains or fault domains, a Load Balancer is used.

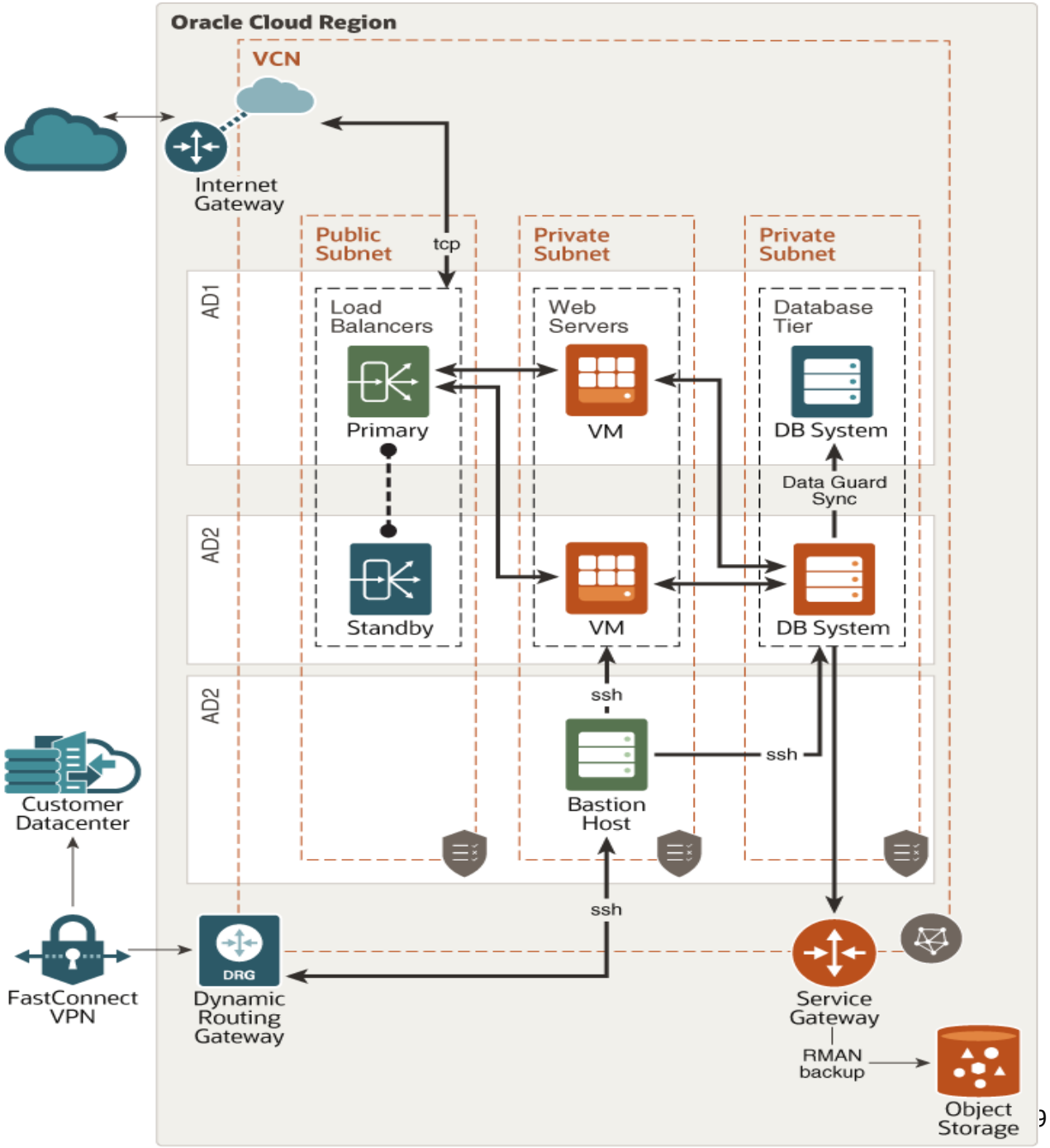
HA for Oracle Databases - RAC

- 2-node RAC DB Systems on virtual machine instances
  - 2-node RAC DB systems provide built-in high-availability
  - Available in Database PaaS
    - ExaCS
    - ExaScale
    - Database System Extreme Performance (DBCS)



HA for Oracle Databases - DG

- For solutions with a single-node DB system, use Oracle Data Guard to achieve high availability.
  - Database service requires two databases, one in a primary role and one in a standby role.
  - Configurable in Database PaaS and IaaS
  - Place the DB System of the standby database in a different availability domain from the DB System of the primary database.



Replication Technologies for DR

OCI Core Technology Services

- Oracle Databases
  - Data Guard, Active Data Guard, Golden Gate
  - Backup & Restore
- Compute
  - Replicate boot volume
- Application
  - Replicate storage volumes
  - Rsync
- Backups
  - Replicate object storage
- Network
  - Provision redundant services

Challenges with DR

Reduce Downtime

Application Downtime cause significant financial impact and reputation

Additional Infrastructure

Need to maintain additional data centers for DR purpose

Managing complexity

Complex environments with stringent RTO and RPO

Ensuring compliance

Need to comply with various regulatory guidelines

Automating Disaster Recovery

OCI - Full Stack Disaster Recovery

Orchestrates disaster recovery at scale in the cloud

Full Stack DR is a fully managed disaster recovery (DR) service providing:

Disaster recovery for the entire application stack:

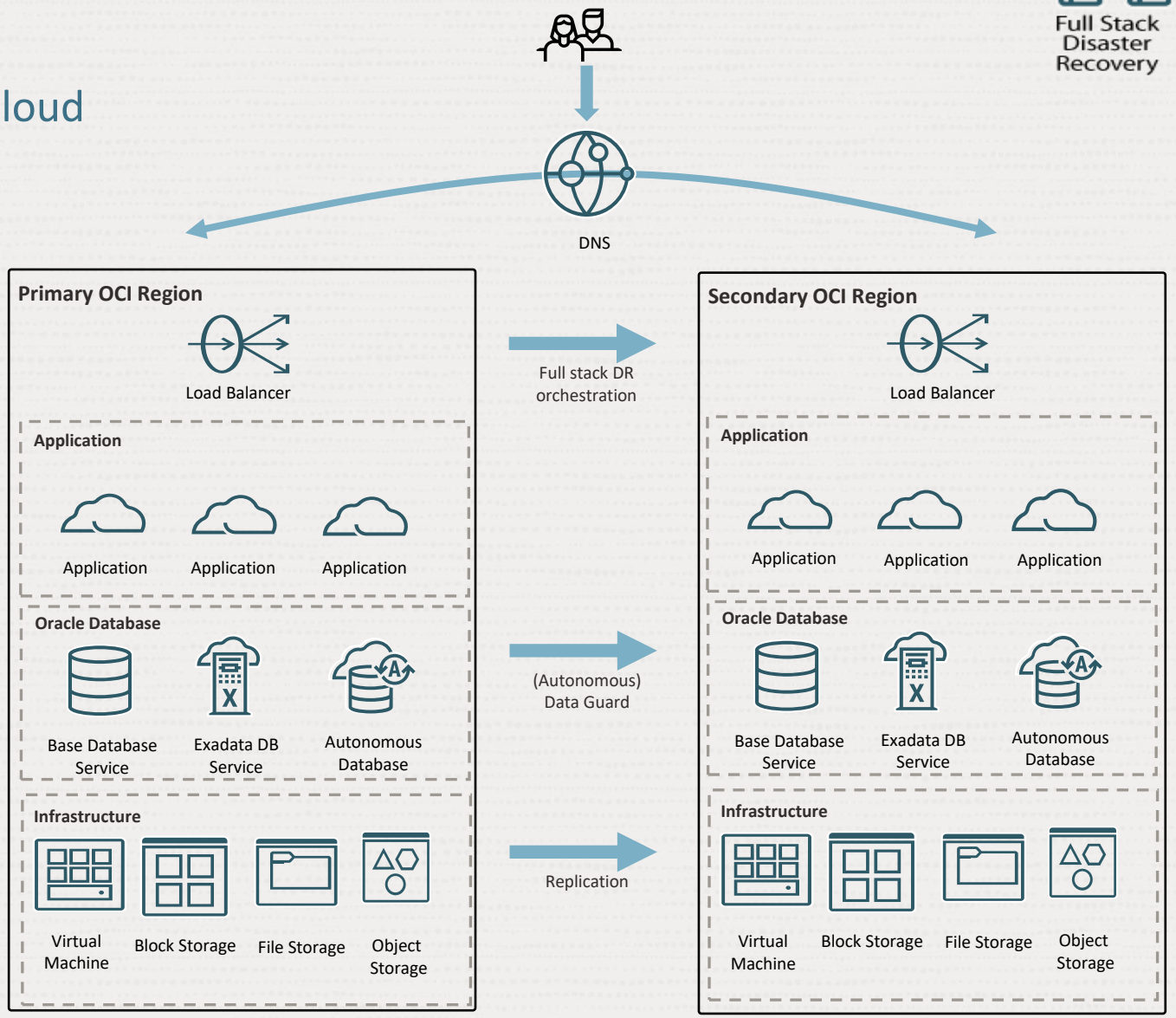
- Orchestrated single-click DR for compute, databases & applications

Automated DR plan creation:

- Built-in intelligent modules automatically generate prepopulated DR plans

Unified management :

- Validate and monitor the execution of DR runbooks for one or more systems using a single pane of glass



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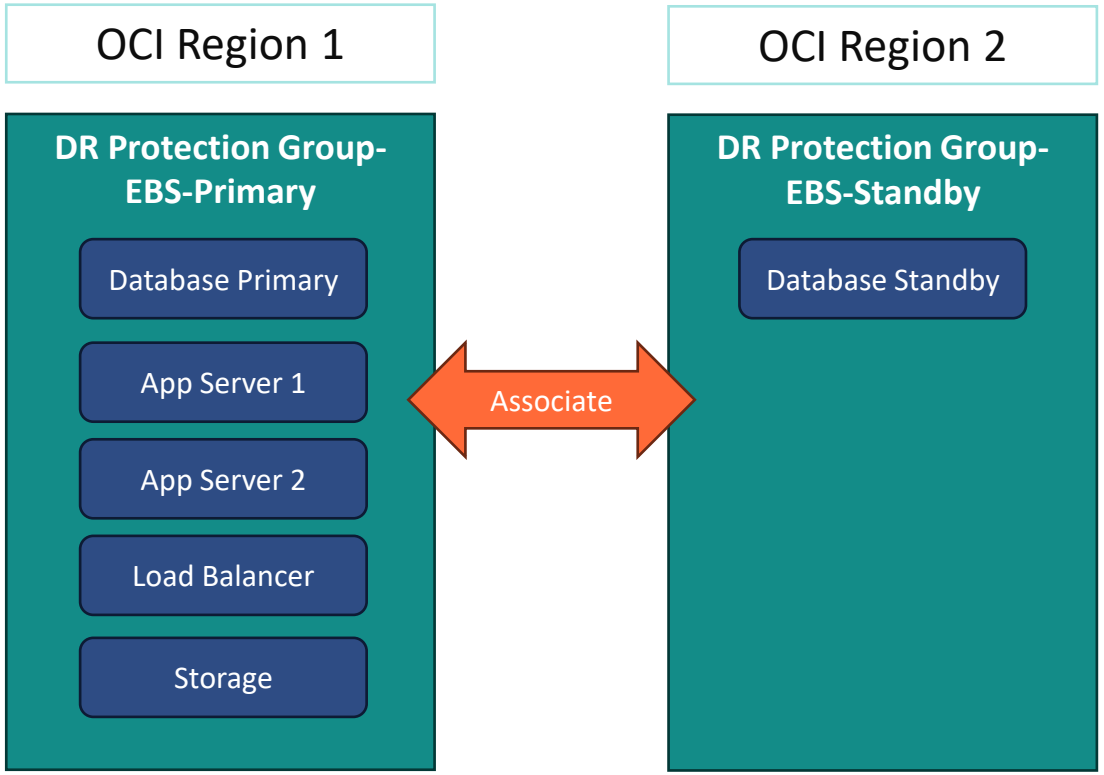
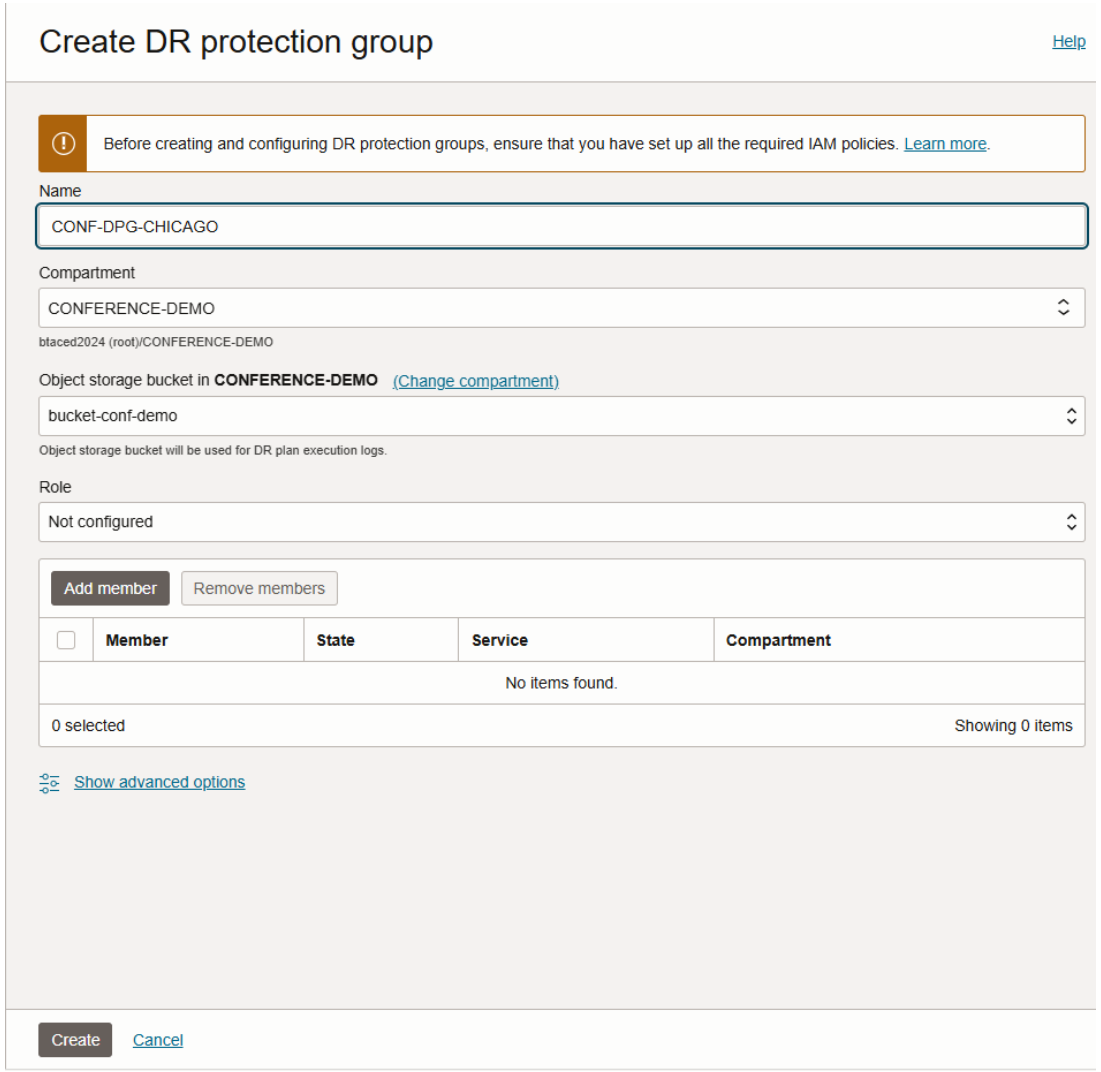
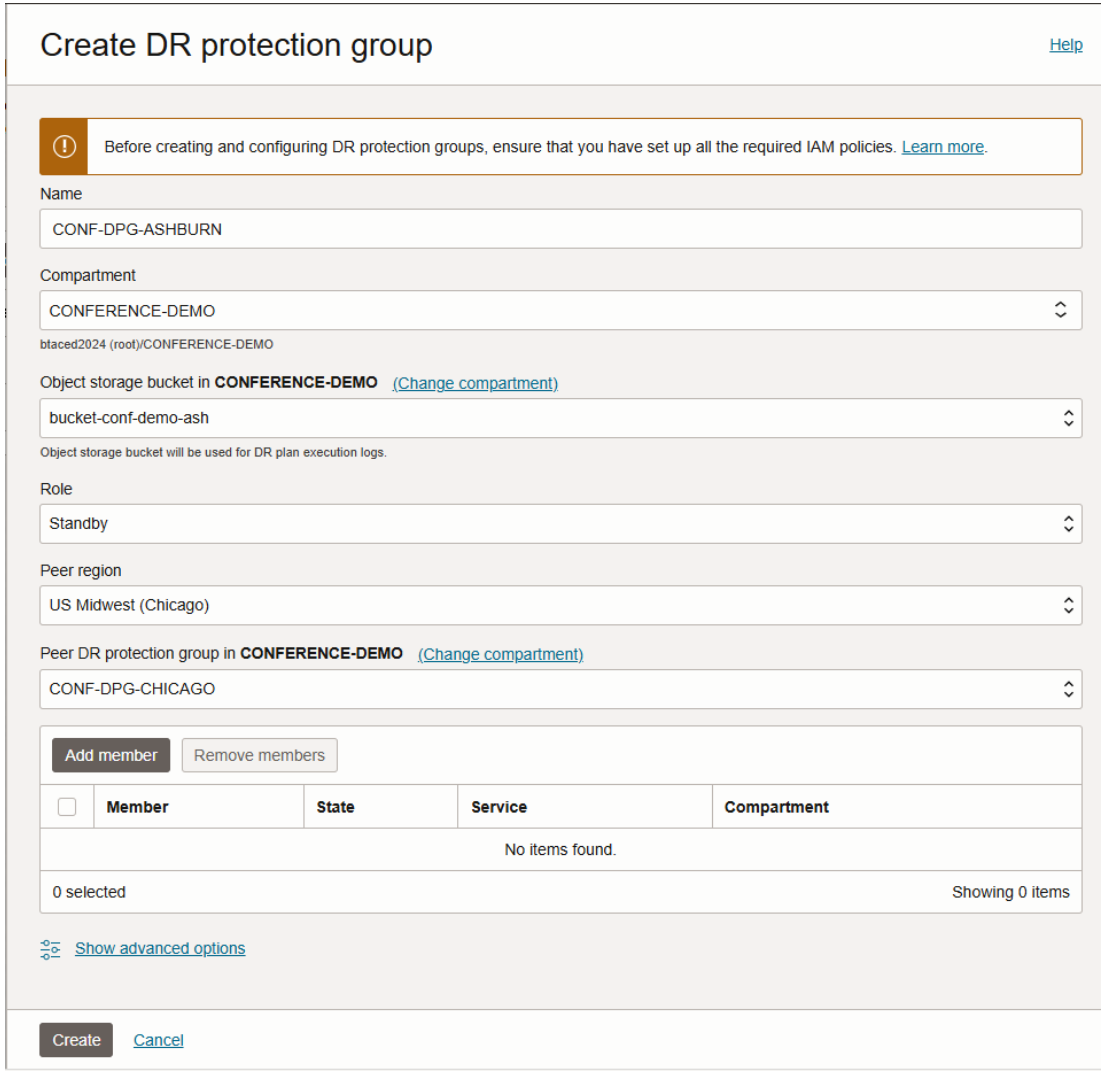
FSDR – Terminology and Concept

- DR Protection Group
  - A collection of different OCI resources comprising an application are treated as a combined group when performing disaster recovery operations.
- Protection Group Member
  - Various OCI Resources in the group
- DR Plan
  - A DR Plan represents a DR workflow associated with a pair of DR Protection Groups.

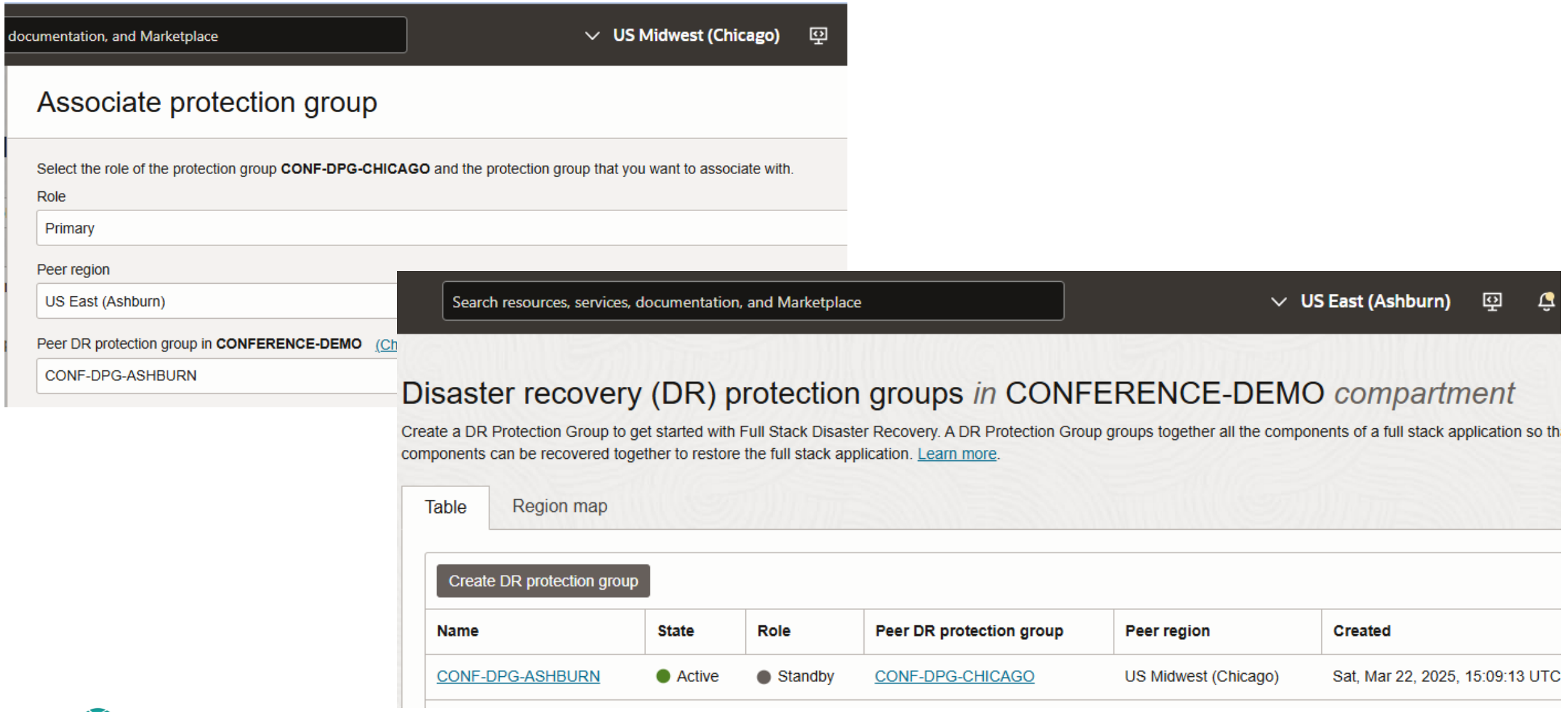


DR Protection Group



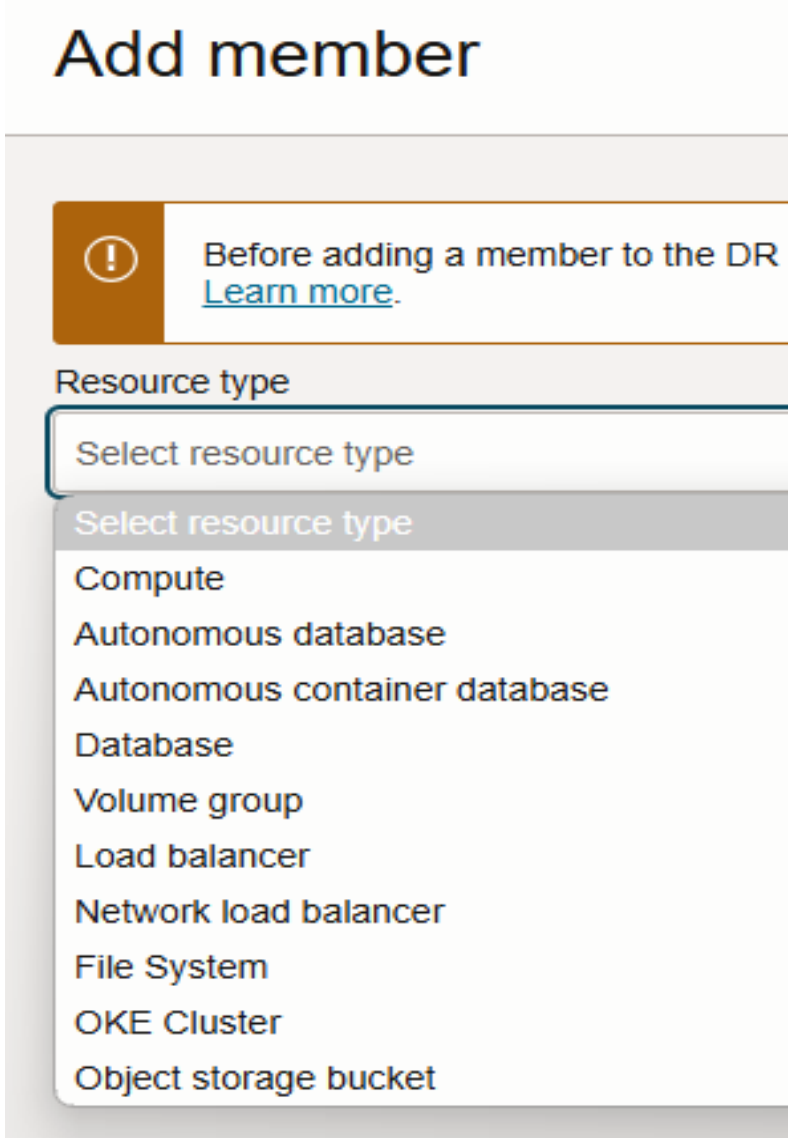


Link Protection Groups

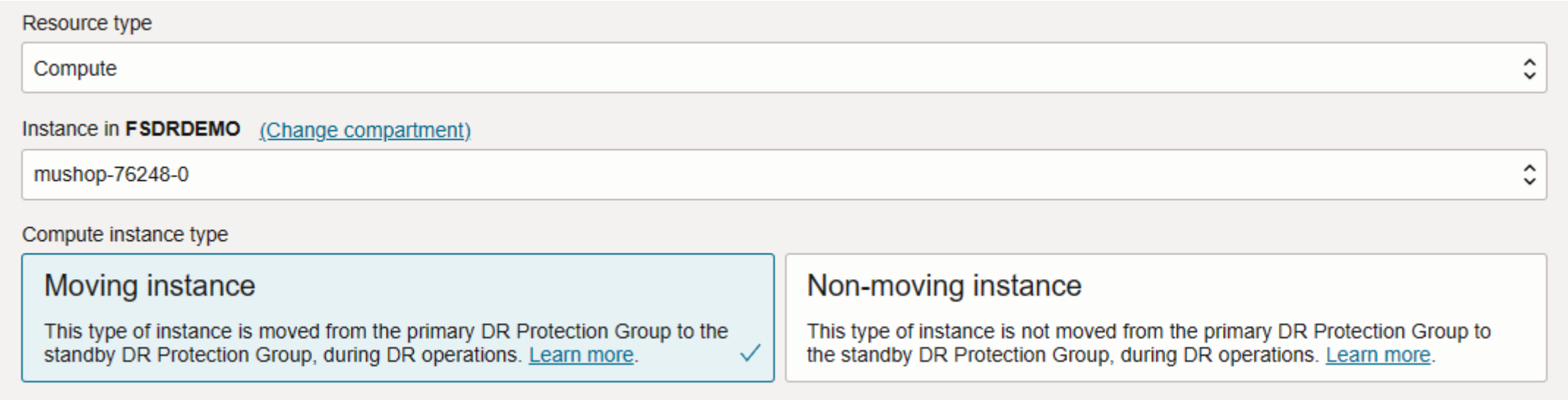


FSDR Component – DR Protection Group Members

- **Compute (Standard Compute and Dedicated VM Host (DVH))**
- **Block Storage (Volume Groups)**
- Oracle Autonomous Database Serverless (ADB-S)
- Oracle Autonomous Database on Dedicated Exadata Infra
- Autonomous Database on Exadata Cloud@Customer
- **Oracle Base Database Service (BaseDB/DBCS)**
- **Oracle Exadata Database Service on Dedicated Infrastructure**
- Oracle Exadata Database Service on Cloud@Customer (ExaCC)
- Oracle Exadata Database Service on Exascale Infrastructure
- **Load Balancer and Network Load Balancer**
- **File Storage Service**
- **Object Storage Bucket**



Compute Member – Moving vs Non-Moving

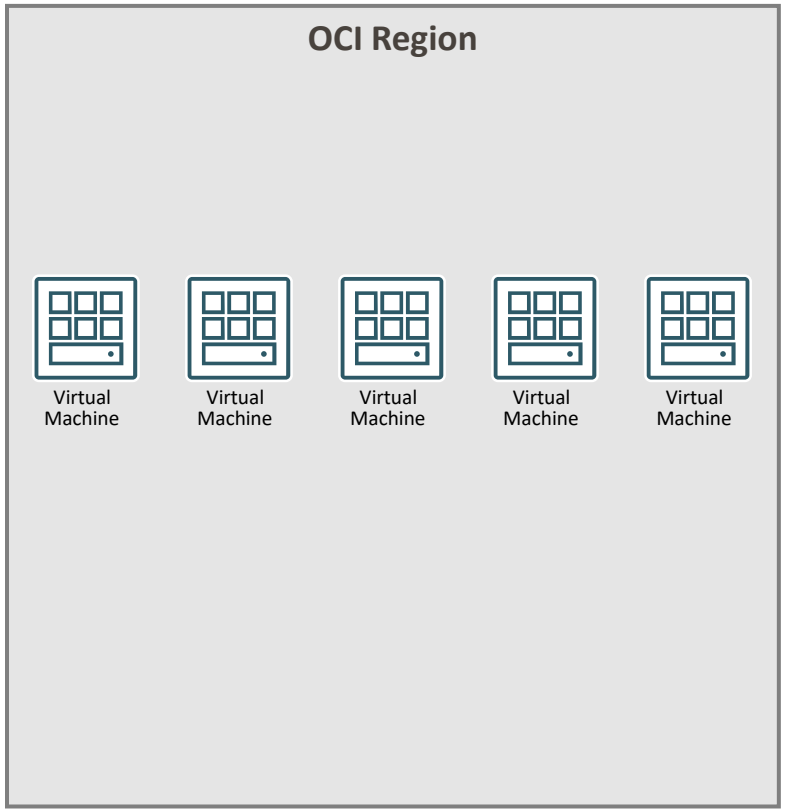


- No compute VM running in the DR region
- Use “movable” compute to automate recovery for active/passive type DR strategies:
  - VM failover
  - Cold standby
  - Pilot light

- Compute VM running in the DR region
- Use “non-movable” compute to automate recovery for active/active and active/standby type DR strategies:
  - active/active
  - warm standby
  - hot standby

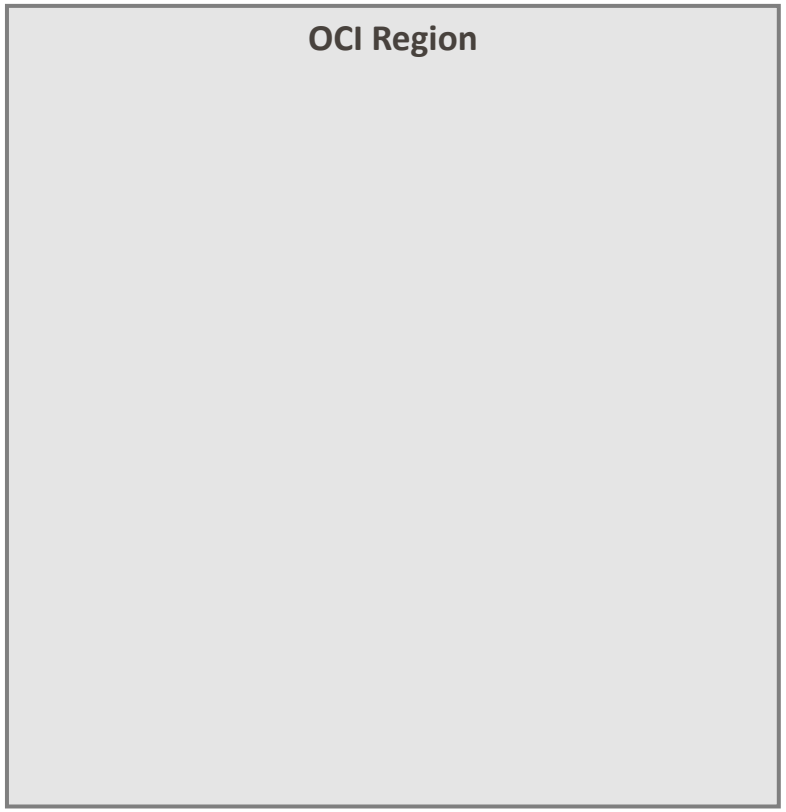
The concept of movable compute

Virtual machines “move” between two OCI regions



Use “movable” compute to automate recovery for active/passive type DR strategies:

- VM failover with database
- VM failover without database
- cold standby
- pilot light



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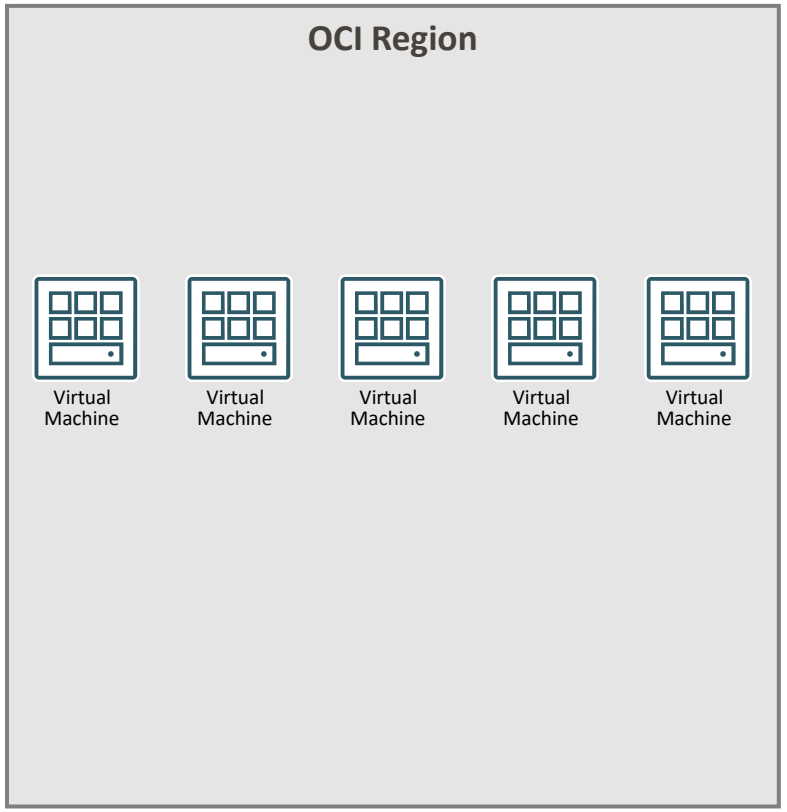
The concept of non-movable compute

Unique virtual machines exist at both OCI regions & stop/start as needed



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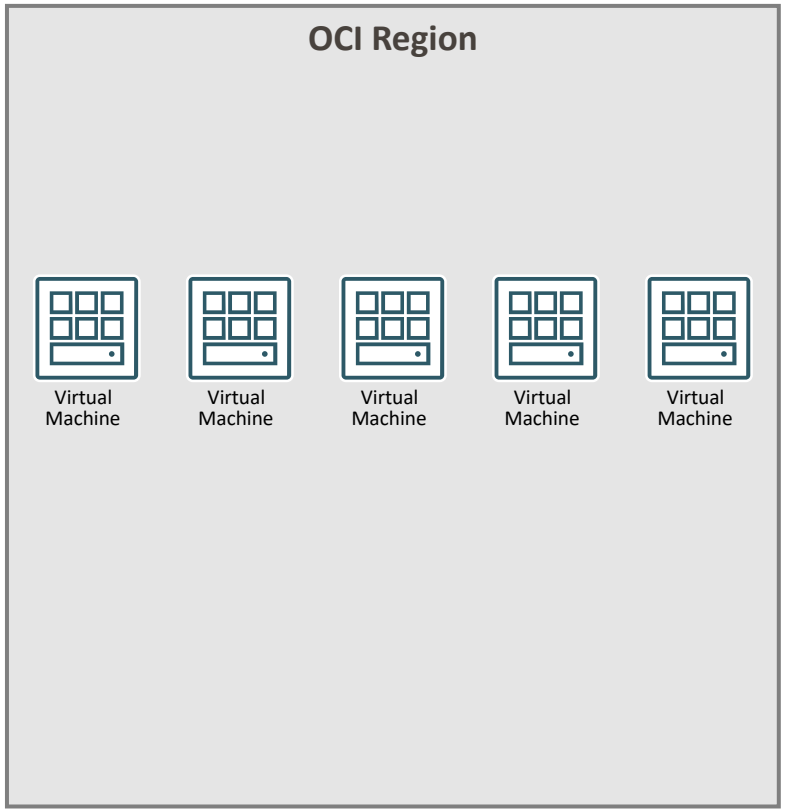

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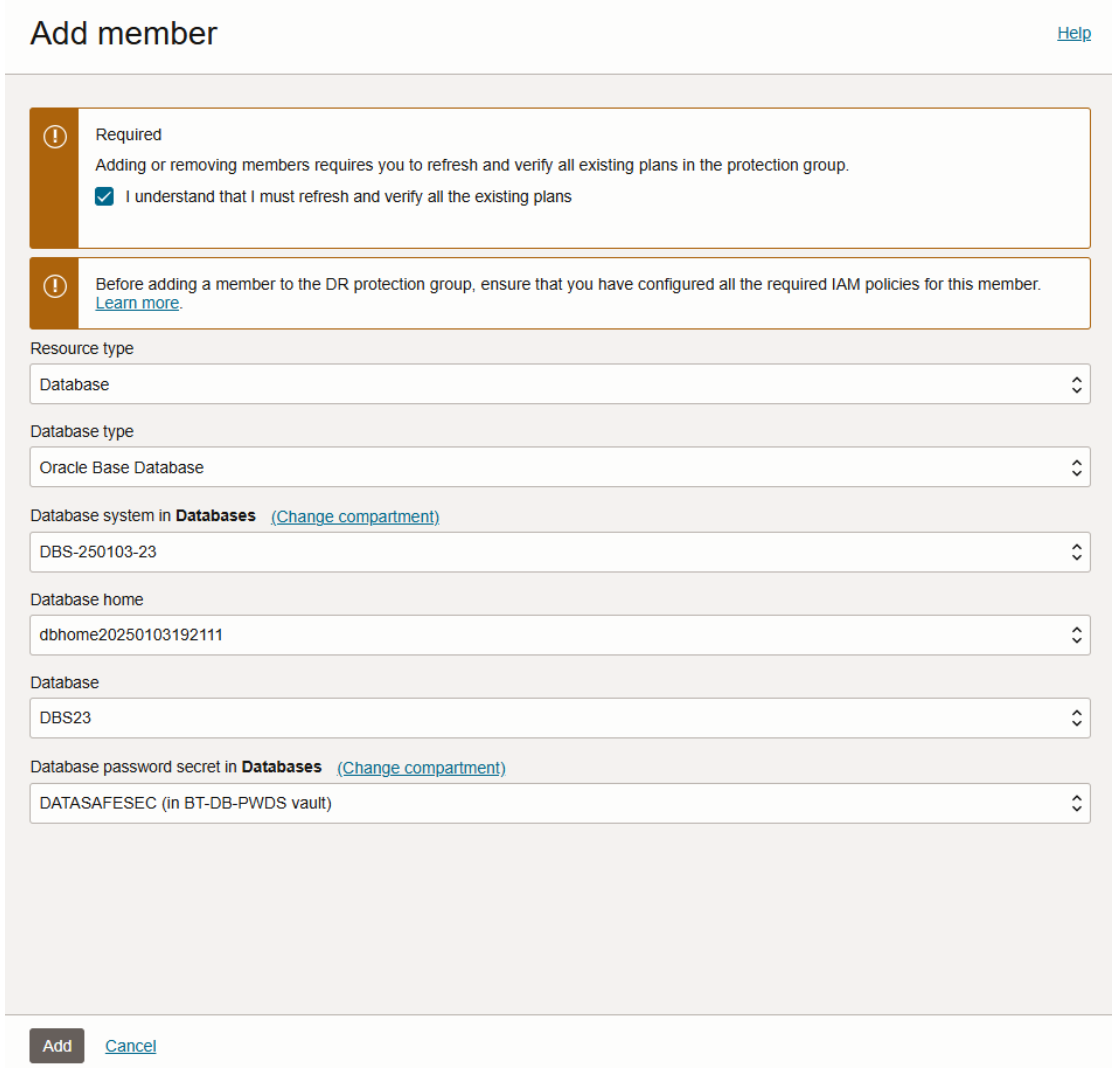
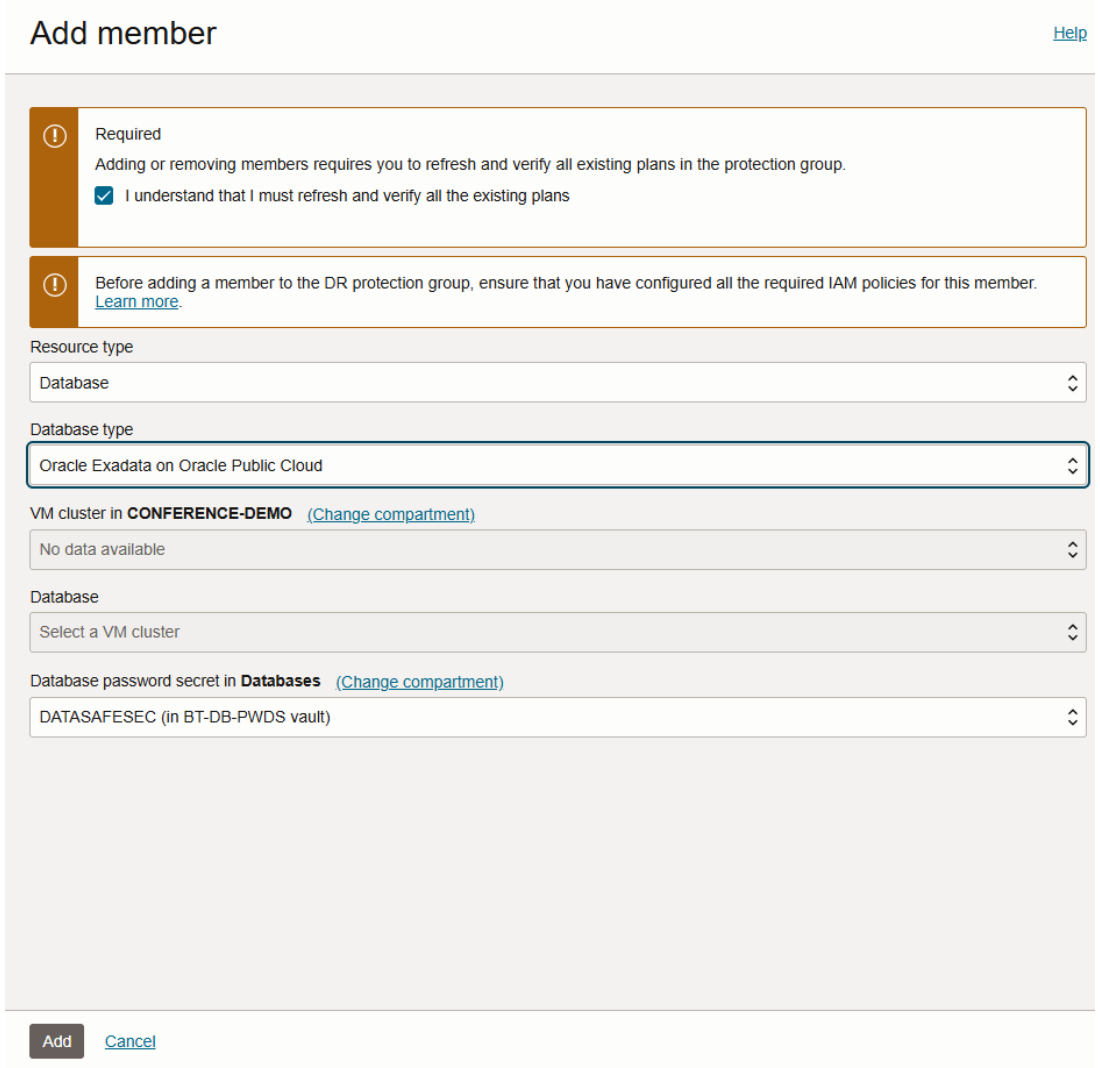
Database Member – DB Properties





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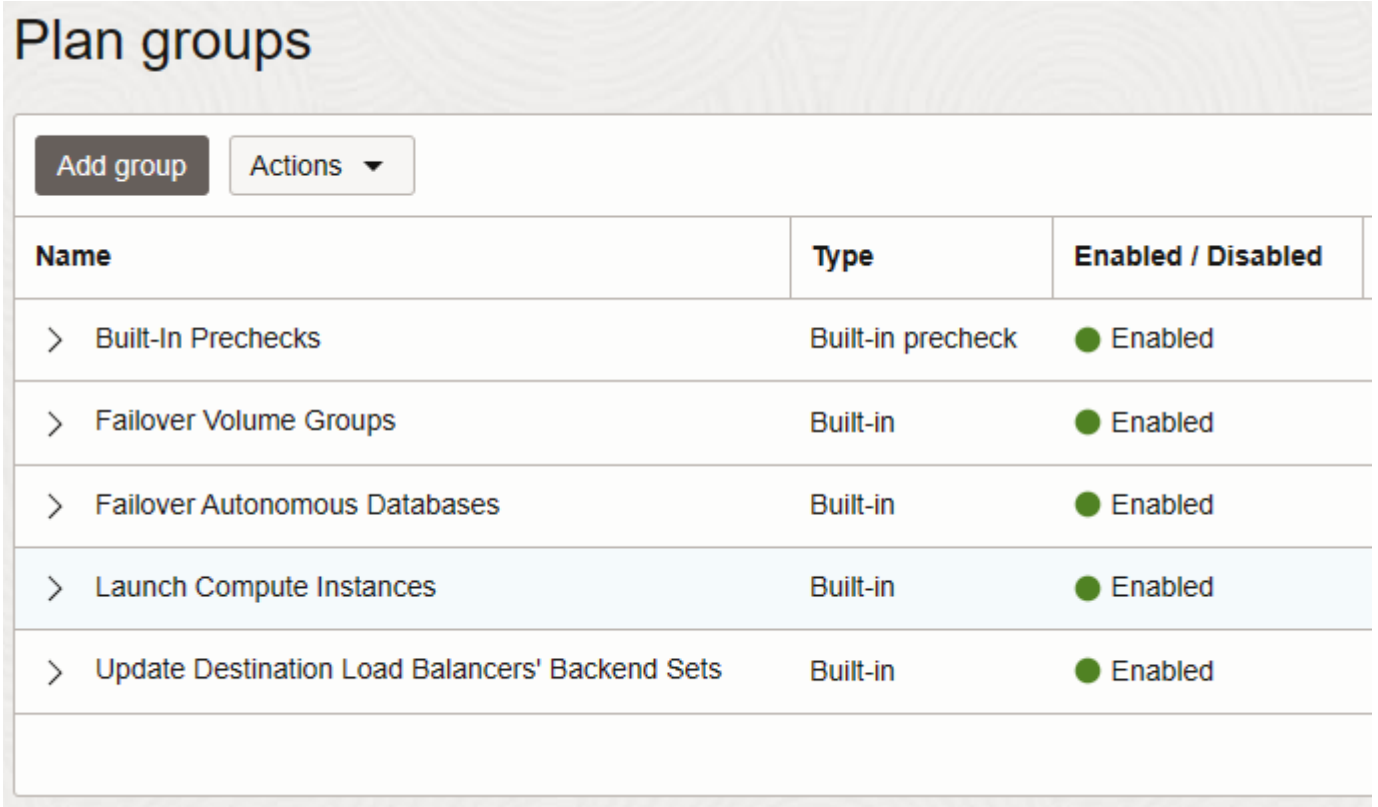
FSDR Component – DR Plans

- Failover:
  - Recover at standby
- Switchover:
  - Shutdown primary, then transition to standby
- Start Drill:
  - Perform a complete dry run of failover for validation
- Stop Drill:
  - Tear down workload (created or converted during Start Drill plan) at standby

Failover Plan



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Switchover Plan

Name	Type	Enabled / Disabled
Built-In Prechecks	Built-in precheck	Enabled
Update Source Load Balancers' Backend Sets	Built-in	Enabled
Stop Compute Instances	Built-in	Enabled
Switchover Volume Groups	Built-in	Enabled
Switchover Autonomous Databases	Built-in	Enabled
Launch Compute Instances	Built-in	Enabled
Update Destination Load Balancers' Backend Sets	Built-in	Enabled
Reverse Volume Groups' Replication	Built-in	Enabled
Terminate Compute Instances	Built-in	Disabled
Remove Compute Instances from DR Protection Group	Built-in	Enabled
Terminate Volume Groups	Built-in	Disabled
Remove Volume Groups from DR Protection Group	Built-in	Enabled

FSDR Component – DR Plans

- Failover:
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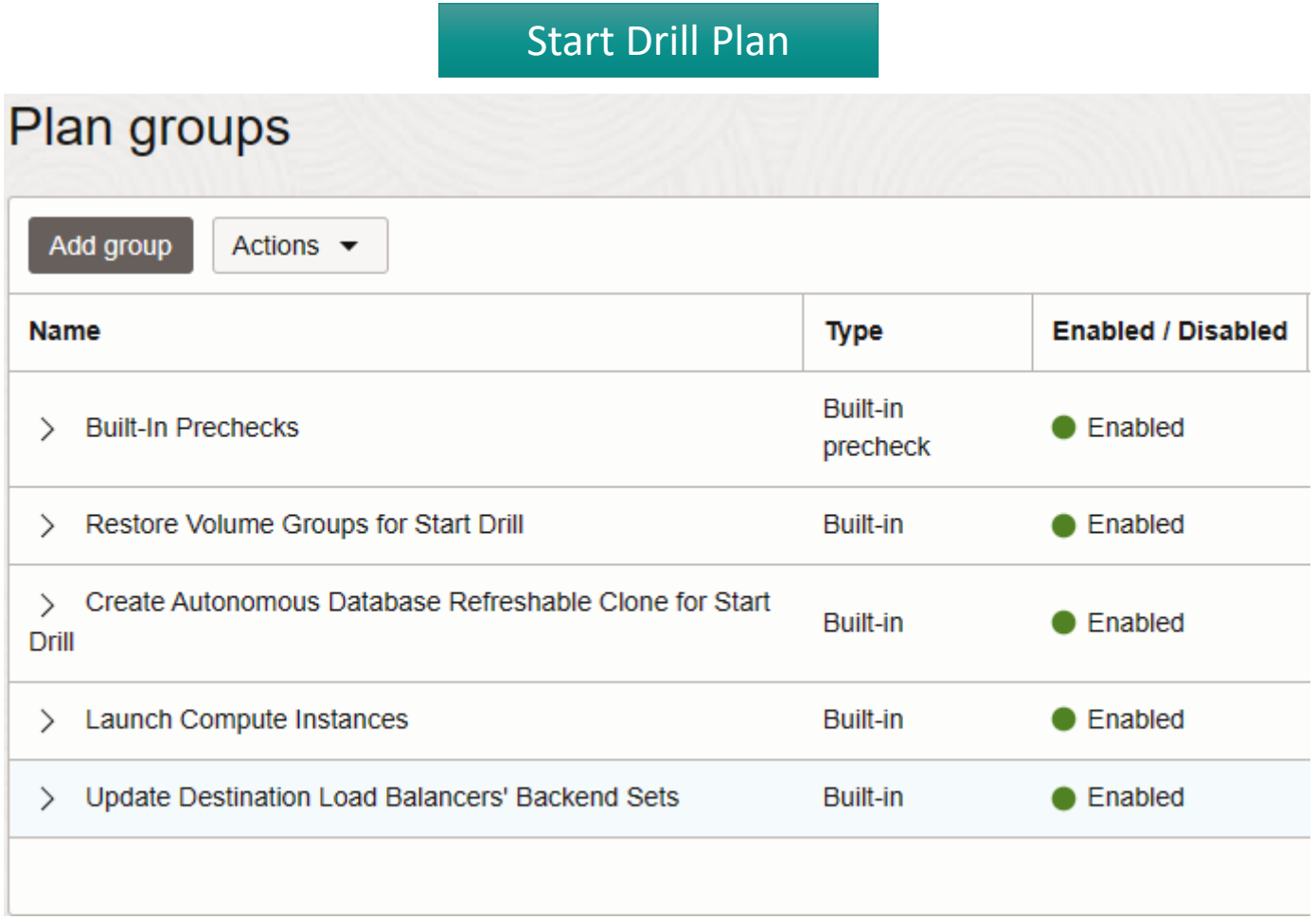

FSDR Generated Steps – Virtual Machine and Attached Storage

Moving

Plan Group (Order of Execution)	Switchover Action (Primary Region)	Switchover/Failover Action (Standby Region)
Pre-Transition	**Stop Compute Instances:** Gracefully shuts down the VM.	N/A
Transition	N/A	**Switchover/Failover Volume Groups:** Activates the replicated boot and block volumes.
	N/A	**Launch Compute Instances:** Provisions and starts a **new VM** using the now-active replicated volumes.
Post-Transition	**Terminate Compute Instances:** Deletes the original VM (optional but recommended for cost).	**Attach Block Volumes:** Attaches the now-active block volumes to the started VM.
Cleanup/ Reverse	**Remove from DR Protection Group:** Removes the terminated VM entry.	**Reverse Volume Groups' Replication:** Configures replication from the new primary back to the new standby.

Non-Moving

Plan Group (Order of Execution)	Switchover Action (Primary Region)	Switchover/Failover Action (Standby Region)
Pre-Transition	**Detach Block Volumes:** Ensures data integrity by detaching block volumes from the primary VM.	N/A
	Stop Non-Moving Compute Instances: Shuts down the primary VM.	N/A
Transition	N/A	**Switchover/Failover Volume Groups:** Activates the replicated boot and block volumes.
	N/A	**Start Non-Moving Compute Instances:** Starts the pre-deployed standby VM.
Post-Transition	N/A	**Attach Block Volumes:** Attaches the now-active block volumes to the running VM.
Cleanup/ Reverse	**Reverse Volume Groups' Replication:** Configures replication from the new primary back to the new standby.	**Switchover: Reverse Volume Groups' Replication:** Configures replication from the new primary back to the new standby.

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FSDR Generated Steps – Virtual Machines and File Storage

Plan Group (Phase)	Compute Instance (Moving/Cold Standby)	Compute Instance (Non-Moving/Warm Standby)	File Service (FSS)
1. Pre-Transition	**Stop Compute Instances** (Graceful shutdown on Primary).	**Unmount File Systems** (From Primary App Servers).	**Unmount File System** (From Primary App Servers).
(Primary Shutdown)	N/A	**Detach Block Volumes** (From Primary VM).	N/A
	N/A	**Stop Non-Moving Compute Instances** (Shuts down Primary VM).	N/A
2. Transition	**Switchover/Failover Volume Groups** (Activates the replicated boot/data volumes in Standby).	**Switchover/Failover Volume Groups** (Activates replicated volumes in Standby).	**Switchover/Failover File Systems** (FSS role change to Standby).
(Role Change)	**Launch Compute Instances** (Provisions a **NEW** VM in Standby using active volumes).	**Start Non-Moving Compute Instances** (Starts the pre-deployed Standby VM).	N/A
3. Post-Transition	N/A	**Attach Block Volumes** (Attaches active volumes to the started Standby VM).	**Mount File System** (To New Primary App Servers).
(New Primary Startup)	User-Defined Steps to launch application.	**Mount File System** (To New Primary App Servers).	N/A
4. Cleanup/Reverse	**Terminate Compute Instances** (Optional: Deletes the original Primary VM).	N/A	**Reverse File System Replication** (Starts replicating from new Primary back to new Standby).
(Prepare for Next DR)	**Reverse Volume Groups' Replication** (Sets replication from new Primary back to new Standby).	**Reverse Volume Groups' Replication** (Sets replication from new Primary back to new Standby).	N/A

FSDR Generated Steps – Oracle Database

Plan Group (Phase)	Built-in Step	Purpose / Action	Key Technology
1. Pre-Transition	**Perform Prechecks**	Validates the readiness and health of the Data Guard association, ensuring the standby is synchronized and ready for the role change.	Data Guard, OCI FSDR
(Primary Shutdown)	**Stop Compute Instances** (Non-Moving)	Gracefully shuts down the application servers/VMs that connect to the primary database to guarantee a clean break.	OCI Compute
	Detach Block Volumes (If Applicable)	Safely detaches any necessary block storage volumes from the primary compute instances.	OCI Block Storage
2. Transition	**Switchover Database** (Switchover Plan)	Initiates the controlled **Data Guard Switchover** process: Primary becomes Standby, Standby becomes Primary (Zero Data Loss).	Oracle Data Guard
(Role Change)	**Failover Database** (Failover Plan)	Initiates the urgent **Data Guard Failover** process: Standby immediately becomes the new Primary (Minimal Downtime).	Oracle Data Guard
3. Post-Transition	**Start Non-Moving Compute Instances**	Restarts the pre-deployed application VMs in the now-primary region.	OCI Compute
(New Primary Startup)	**Attach Block Volumes**	Re-attaches necessary block volumes to the newly started compute instances.	OCI Block Storage
	User-Defined Steps (e.g., Start Application)	The user adds steps here to update application connection strings (TNS) and start the application services.	Application Specific
4. Cleanup/Reverse	**Database Role Reversal**	Data Guard automatically continues its association, with the new Primary replicating to new Standby. No explicit FSDR step needed for Data Guard itself.	Oracle Data Guard
(Prepare for Next DR)	**Reverse Volume Groups' Replication** (If Applicable)	Configures block storage replication from the new Primary back to the new Standby environment.	OCI Block Storage

FSDR Plan – Customize and Reorder

- User Defined Plans
  - Run local script
  - Run object storage script
  - Invoke function

Switchover Plan

Name	Type	Enabled / Disabled
Built-In Prechecks	Built-in precheck	Enabled
Update Source Load Balancers' Backend Sets	Built-in	Enabled
Stop Compute Instances	Built-in	Enabled
Switchover Volume Groups	Built-in	Enabled
Switchover Autonomous Databases	Built-in	Enabled
Launch Compute Instances	Built-in	Enabled
Update Destination Load Balancers' Backend Sets	Built-in	Enabled
Restore Database Wallet	User defined	Enabled
Restore Database Wallet on Node-0	Run local script	Enabled
Restore Database Wallet on Node-1	Run local script	Enabled
Restore Application	User defined	Enabled
Restore Application on Node-0	Run local script	Enabled
Restore Application on Node-1	Run local script	Enabled
Reverse Volume Groups' Replication	Built-in	Enabled
Terminate Compute Instances	Built-in	Disabled
Remove Compute Instances from DR Protection Group	Built-in	Enabled
Terminate Volume Groups	Built-in	Disabled
Remove Volume Groups from DR Protection Group	Built-in	Enabled

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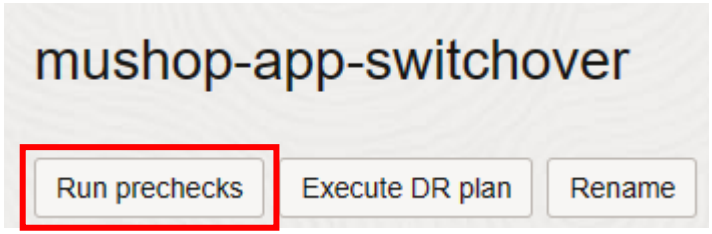
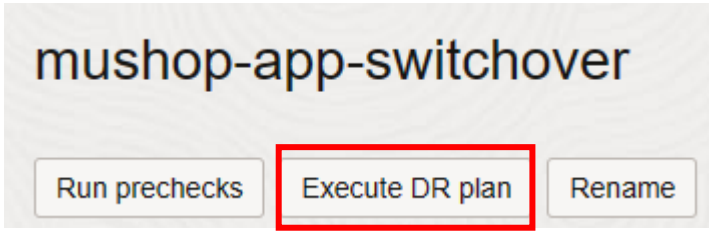
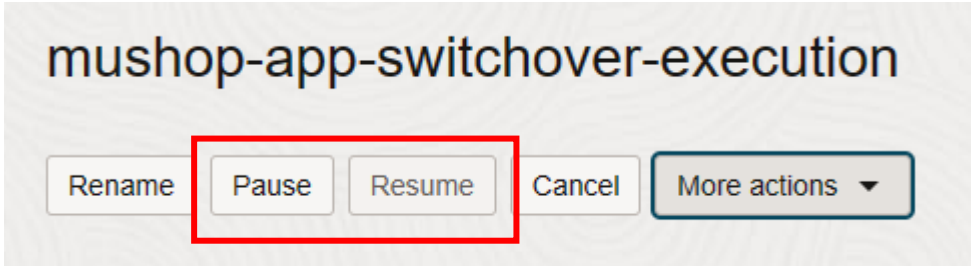
FSDR Plan – Run Prechecks



Built-In Prechecks	Built-in precheck
MuShopDB76248	Autonomous Database switchover precheck
mushop-76248-0	Launch compute instance precheck
mushop-76248-1	Launch compute instance precheck
mushop-76248-0	Remove compute instance precheck
mushop-76248-1	Remove compute instance precheck
mushop-76248-0	Stop compute instance precheck
mushop-76248-1	Stop compute instance precheck
Source load balancer - mushop-76248	Update primary load balancer backend set precheck
Destination load balancer - mushop-76248	Update standby load balancer backend set precheck
mushop-volume-group-0	Remove volume group precheck
mushop-volume-group-1	Remove volume group precheck
mushop-volume-group-0	Restore volume group switchover precheck
mushop-volume-group-1	Restore volume group switchover precheck
Restore Database Wallet on Node-0	Run local script precheck
Restore Database Wallet on Node-1	Run local script precheck
Restore Application on Node-0	Run local script precheck
Restore Application on Node-1	Run local script precheck

FSDR – Execute DR Plan





Plan execution groups

Expand all | Collapse all

Name	Type	State
Update Source Load Balancers' Backend Sets	Built-in	Succeeded
Stop Compute Instances	Built-in	Succeeded
Switchover Volume Groups	Built-in	Succeeded
Switchover Autonomous Databases	Built-in	In progress
Launch Compute Instances	Built-in	Queued
Update Destination Load Balancers' Backend Sets	Built-in	Queued
Restore Database Wallet	User defined	Queued
Restore Application	User defined	Queued
Reverse Volume Groups' Replication	Built-in	Queued
Terminate Compute Instances	Built-in	Disabled
Remove Compute Instances from DR Protection Group	Built-in	Queued
Terminate Volume Groups	Built-in	Disabled
Remove Volume Groups from DR Protection Group	Built-in	Queued

E-Business Suite

DR Automation Using FSDR

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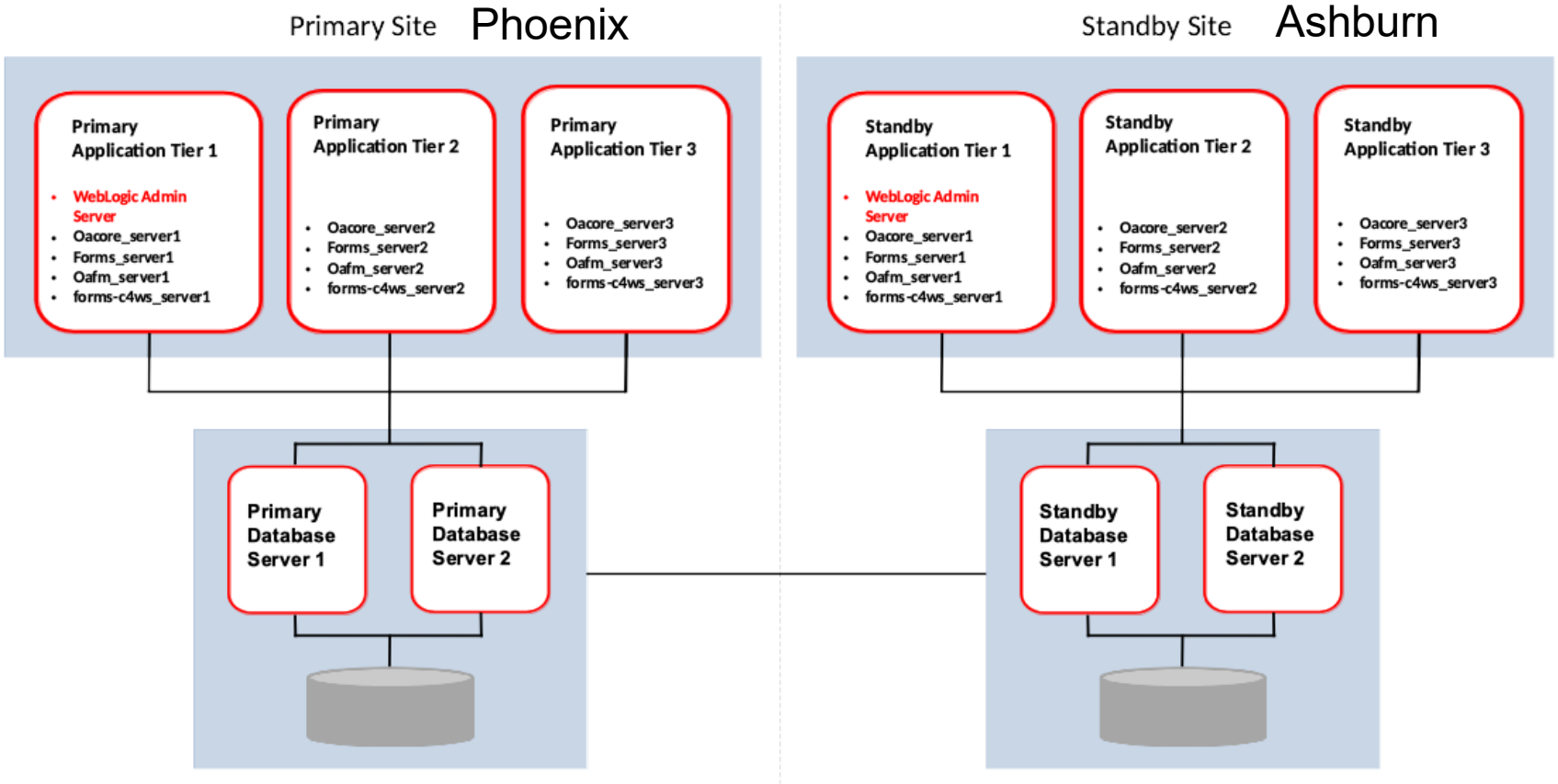
Oracle E-Business Suite Release 12.2 DR Configuration



Business Continuity for Oracle E-Business Suite Release 12.2 with Oracle Database 19c on Oracle Exadata Database Service on Dedicated Infrastructure (Doc ID 2919723.1)

Business Continuity for Oracle E-Business Suite Release 12.2 with Oracle Database 19c on Oracle Base Database Service DB Systems (Doc ID 2875417.1)

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DR Setup – Create DR Environment

FSDR is an Orchestration engine.
It will not configure replication or business continuity.

- Database and Application
  - Create a standby database in the secondary region – configure Data Guard.
  - Create application servers in the secondary region
    - Configure rsync OR
    - Configure application storage replication
  - Manually test all DR steps and validate

Create DR Environment using Cloud Manager

- Cloud Manager 25.2.0 includes the DR environment creation option.
  - Create DR - Create a disaster recovery (DR) environment from your primary environment in a different region, or in the same region and a different availability domain.
  - Switchover - Perform a planned transition (switch) of the roles of your primary environment and its associated DR environment.
  - Failover - If the primary environment fails or becomes unreachable, you can use the failover feature to convert the DR environment into the primary environment.
  - Reinstate - After a failover event, reinstate (recover) your original primary environment as the DR environment.

- Provisioning
  - One click
  - Advanced
- Migration
  - Lift and Shift
- Lifecycle Management
  - Cloning
  - Refresh
  - Backup Recovery
  - Disaster Recovery
  - Node Management
  - Discovery
- Extensibility
  - Framework

Oracle E-Business Suite Cloud Manager Guide

Replication Technologies for EBS Layers

EBS Layer	OCI Resource	Moving Compute (Pilot Light)	Non-Moving Compute (Warm Standby)
Database Tier	**DBCS / Exadata DB**	**Oracle Data Guard** (Handles DB Role Switch)	**Oracle Data Guard** (Handles DB Role Switch)
App Tier System/Boot	**Block Volume / Boot Volume**	**OCI Block Volume Cross-Region Replication** (Used to **LAUNCH A NEW VM** in the DR region and Used for Volume Group **RE-ATTACHMENT** to the VM)	**OCI Block Volume Cross-Region Replication** (Used for Volume Group **RE-ATTACHMENT** to the standby VM)
App Tier Shared Data	**File Storage Service (FSS)**	**OCI FSS Cross-Region Replication** (Synchronizes shared binaries and config files)	**OCI FSS Cross-Region Replication** (Synchronizes shared binaries and config files)
App Tier Orchestration	**Compute Instance**	**FSDR Launch Compute Instances** (Creates the VM on demand)	**FSDR Start Non-Moving Compute Instances** (Starts the pre-deployed VM)

FSDR Activities – Non-moving VM

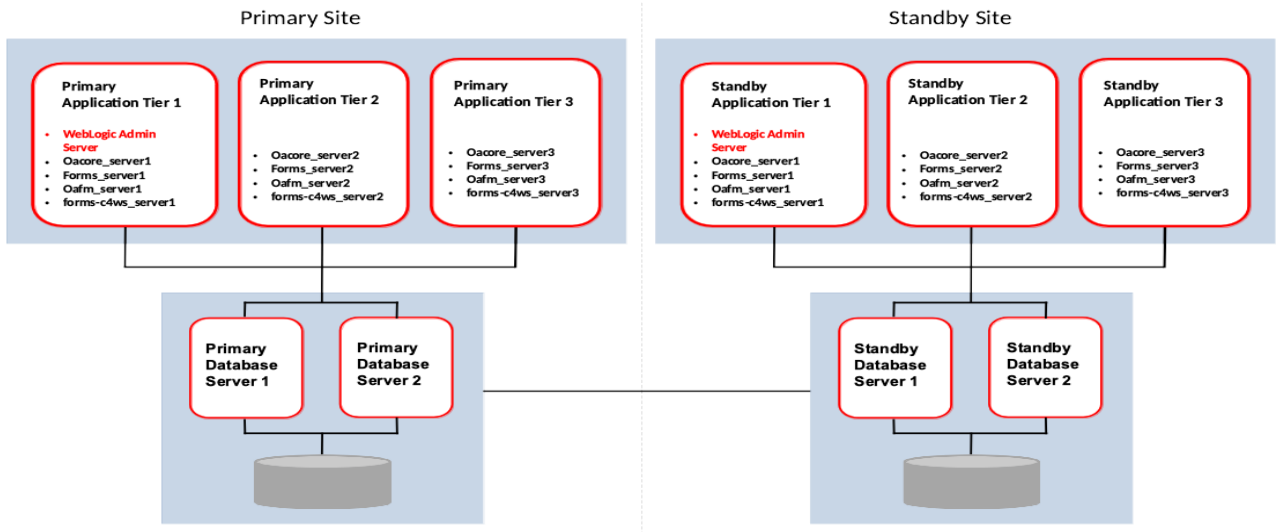
1A. Create Protection Group Phoenix

2A. Add Members
- Primary Database
- App VMs
- App VMs Storage
- File Storage
- Load Balancer

1B. Create Protection Group Ashburn

1C. Associate Protection Groups

2B. Add Members
- Standby Database
- App VMs
- Load Balancer



DATA INTENSITY

FSDR Activities – Moving VM

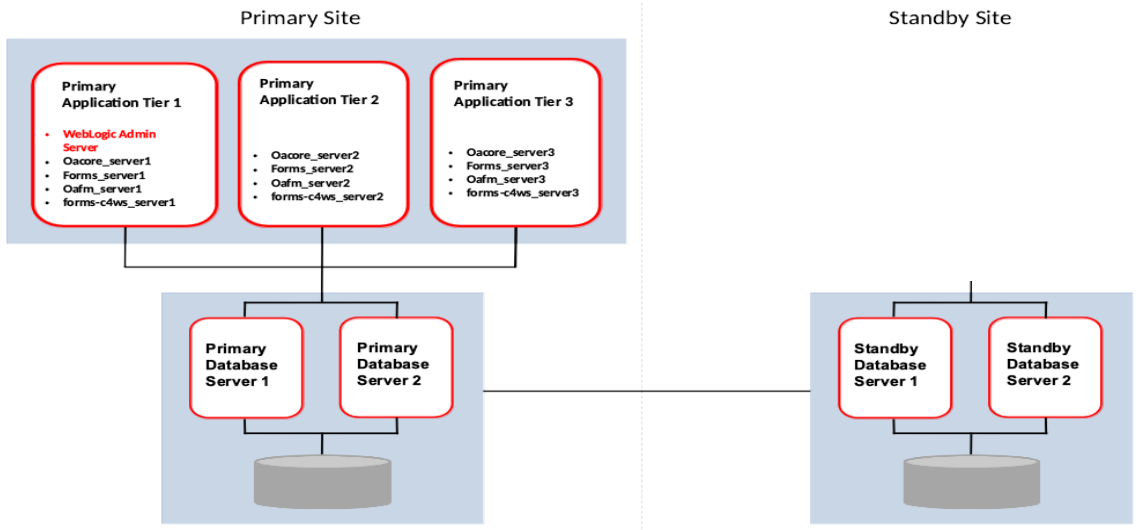
1A. Create Protection Group Phoenix

2A. Add Members
- Primary Database
- App VMs
- App VMs Storage
- File Storage
- Load Balancer

1B. Create Protection Group Ashburn

1C. Associate Protection Groups

2B. Add Members
- Standby Database
- Load Balancer

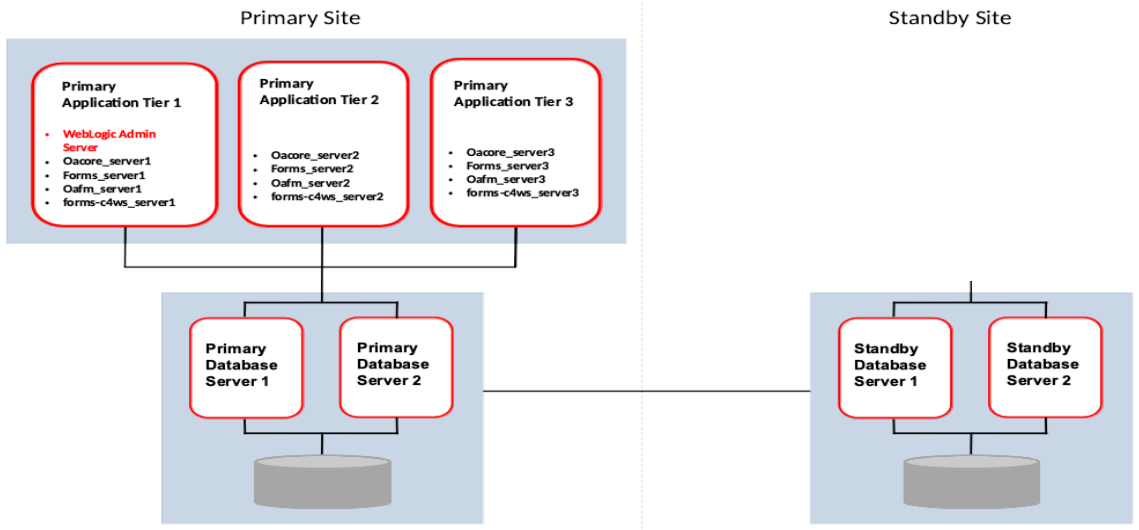


FSDR Activities – Create DR Plans

3A. Create Failover Plan

3B. Create Switchover Plan

3C. Create DR Drill Plan



Customize DR Plans

- **Download Scripts**
  - full-stack-disaster-recovery/fsdr_oracle_apps/ebs_scripts at main · oracle-samples/full-stack-disaster-recovery · GitHub
- **shutdownapps.sh** – Securely shuts down EBS application services.
  - Usage: /bin/sh shutdownapps.sh <SECRET_APPS_OCID>
- **fsdr-rsync-ebs.sh** – Enables/disables rsync-based file sync during DR transitions.
  - Usage: /bin/sh fsdr-rsync-ebs.sh enable <EBS_IP>
  - Usage: /bin/sh fsdr-rsync-ebs.sh disable <EBS_IP>
- **autoconfigapps.sh** – Executes AutoConfig on the application tier with secret OCID handling.
  - Usage: /bin/sh autoconfigapps.sh <SECRET_APPS_OCID>
- **startapps.sh** – Securely starts EBS application services.
  - Usage: /bin/sh startapps.sh <SECRET_APPS_OCID> <SECRET_WEBLOGIC_OCID>
- **dbtxkconfig.sh** – Automates configuration of DB-tier TXK utilities like UTL_FILE_DIR.
  - Usage: /bin/sh dbtxkconfig.sh <SECRET_APPS_OCID> <SECRET_SYSTEM_OCID>
- **fndnodeclean.sh** – Performs cleanup of FND_NODES in the Applications PDB.
  - Usage: /bin/sh fndnodeclean.sh <SECRET_APPS_OCID> <CDB_NAME>

Switchover Plan

- shutdownapps.sh (ASH)
- <stop rsync job>
- <no script for DB switchover>
- fndnodesclean.sh (PHX)
- dbtxkconfig.sh (PHX)
- autoconfigapps.sh (PHX)
- startapps.sh (PHX)

Failover Plan

- <no script for DB failover>
- fndnodesclean.sh (PHX)
- dbtxkconfig.sh (PHX)
- autoconfigapps.sh (PHX)
- startapps.sh (PHX)

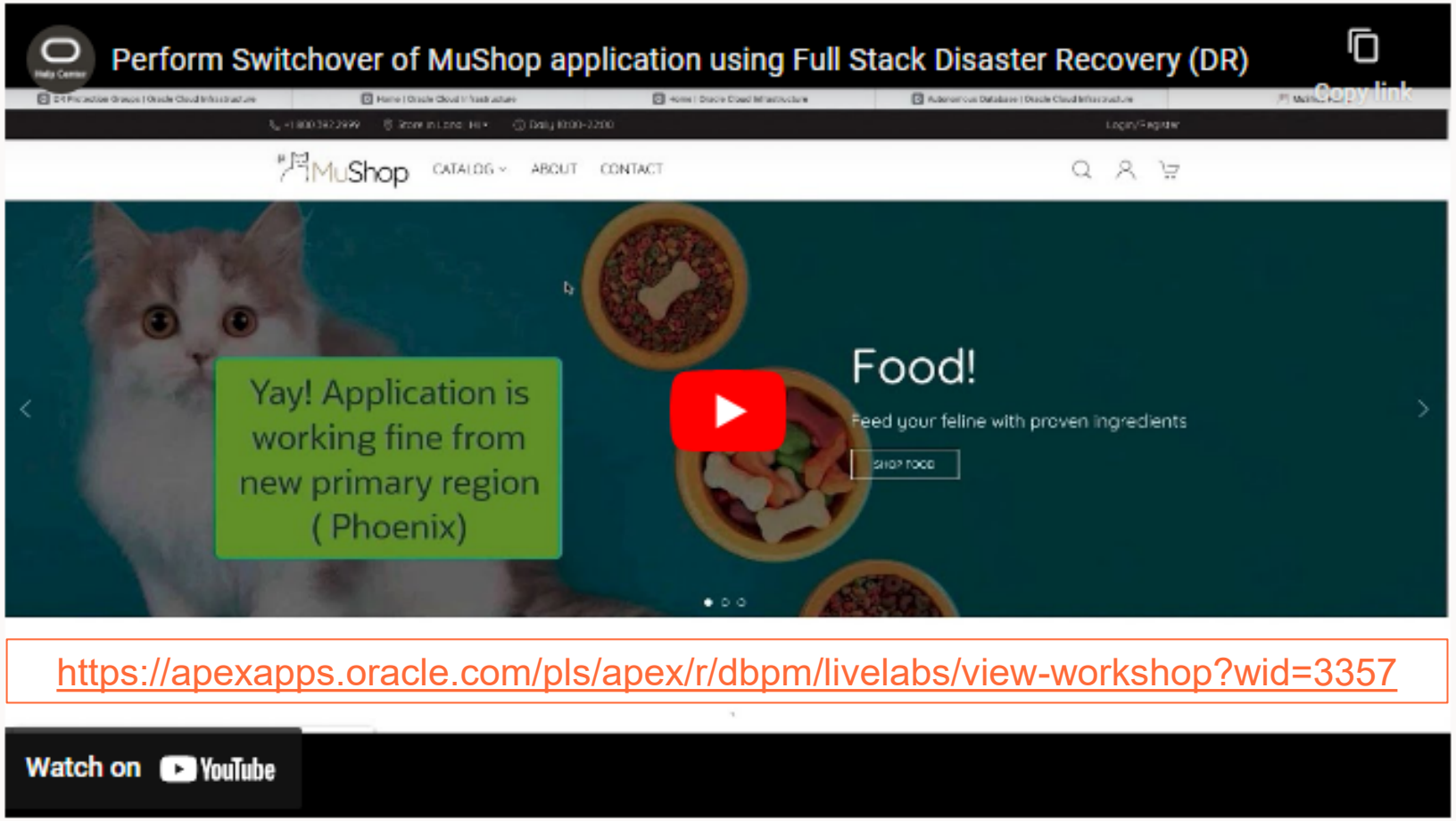
References and Learning

- Oracle Cloud Manager for Disaster Recovery Setup
- Automate Recovery for Multi-Node Oracle **E-Business** Suite Using OCI Full Stack Disaster Recovery
- Oracle E-Business Suite scripts for OCI Full Stack Disaster Recovery
- E-Business Suite Release 12.2 Maximum Availability Architecture

- Business Continuity for Oracle E-Business Suite Release 12.2 with Oracle Database **19c on Oracle Exadata Database Service** on Dedicated Infrastructure (**Doc ID 2919723.1**)
- Business Continuity for Oracle E-Business Suite Release 12.2 with Oracle Database **19c on Oracle Base Database Service** DB Systems (**Doc ID 2875417.1**)
- Business Continuity for Oracle E-Business Suite Release 12.2 with **Oracle Database 23ai Using Logical Host Names** (**Doc ID 3015085.1**)
- Business Continuity for Oracle E-Business Suite Release 12.2 with **Oracle Database 23ai Using Physical Host Names** on Oracle Base Database Service DB Systems (**Doc ID 3020009.1**)
- Business Continuity for Oracle E-Business Suite Release 12.2 with **Oracle Database 23ai on Oracle Exadata Database Service** on Dedicated Infrastructure (**Doc ID 3020008.1**)
- High Availability (HA) Documentation Reference Guide For Oracle E-Business Suite 12.2 Multi Node Installations (**Doc ID 2150358.1**)

Automate Disaster Recovery on OCI using Full Stack Disaster Recovery

Share | Start



3 hours

Outline

- Prepare the environments in Ashburn (Primary) for using the Full Stack DR
- Create DR Protection groups (DRPG) in Ashburn (Primary) and Phoenix (Standby) regions.
- Associate Ashburn DRPG as Primary and Phoenix DRPG as Standby.
- Add members to Ashburn DRPG. Application Virtual machines, Volume groups, and Primary ATP database.
- Add members to Phoenix DRPG. Standby ATP Database.
- Create and Customize DR Switchover Plan in Phoenix(Standby) DRPG
- Run DR Switchover Pre-checks in Phoenix(Standby) DRPG
- Verify and create an outage to the MuShop application from Ashburn (Primary) region.
- Run DR Switchover Plan in Phoenix(Standby) DRPG
- Verify the MuShop application from Phoenix (New Primary) region.

About This Workshop

OCI Full Stack Disaster Recovery (Full Stack DR) provides a fully automated and comprehensive disaster recovery orchestration solution for all the layers of a full-stack cloud application, including infrastructure, database, and application. Using Full Stack DR, you can recover your full stack applications across OCI regions, or across availability domains within the same region. Full Stack DR helps to

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Thank you!

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