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# Oracle Site Guard

Automate Business Continuity at Scale

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**February 2022**

# Program Agenda

- Full Stack Disaster Recovery
- Challenges of Business Continuity
- Oracle Maximum Availability Architecture
- Oracle Site Guard Overview
- Oracle Site Guard Features
- Oracle Site Guard Sample DR Plans
- Oracle Site Guard Functionalities and Pre-checks
- Oracle Site Guard Operation types
- Oracle Site Guard Benefits, Best practices
- Oracle Site Guard Differentiators and Resources



# What is full stack Disaster Recovery?

- Switchover (or failover) for the entire application stack (Database, Middle tier etc)
- Each layer in the application stack follows separate techniques of switchover (or failover)
- Process can be Manual/Semi-automated using scripts.



# Challenges of business continuity

- Application data needs to be replicated to DR site
  - Database (using Data Guard or Active Data Guard)
  - Binaries/Configuration/Data for DB and App (using ZFS or other storage replication technologies)
- Different startup/shutdown procedures for each tier
- Infra stack dependencies and ordering required during role transitions
- Data center typically has multiple independent failover/switchover units
- Complete application failover involves failover of both Active Data Guard and file system storage replication

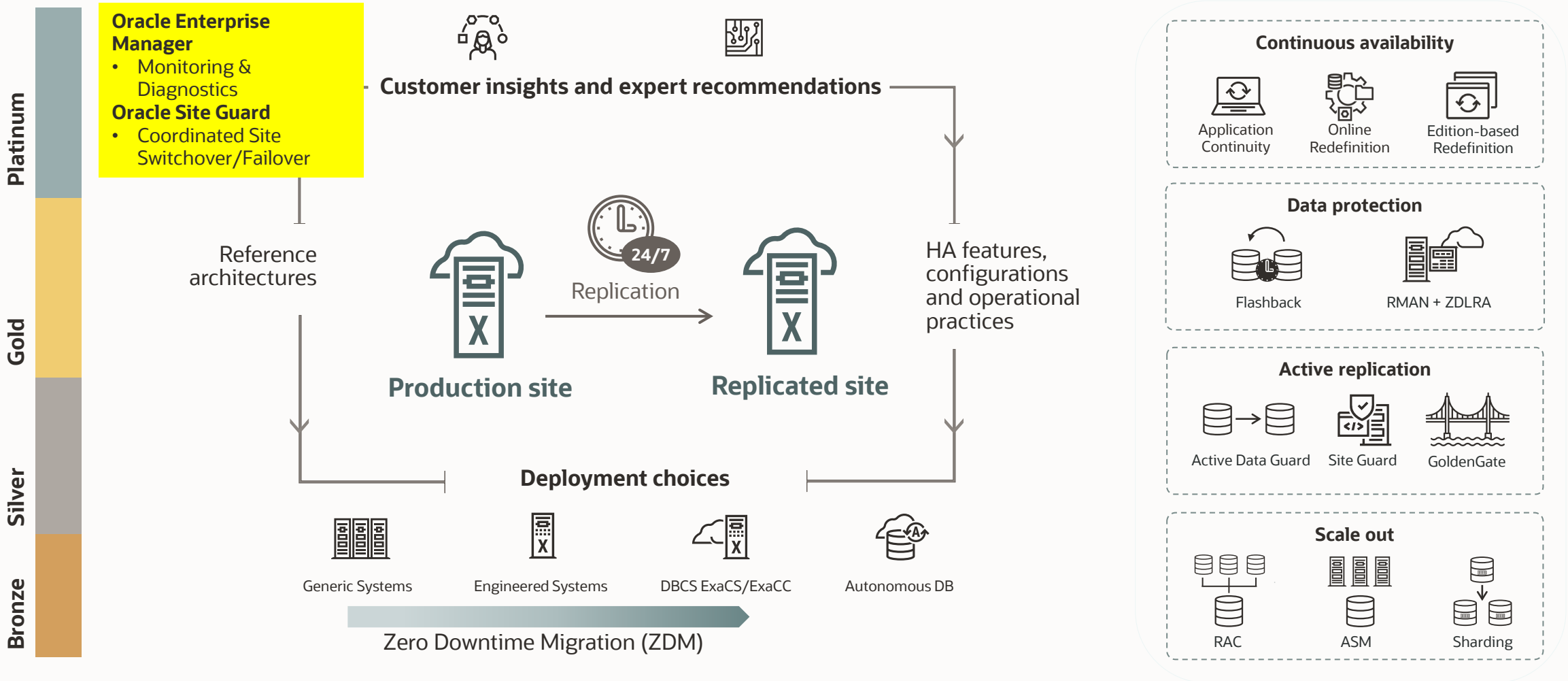
## Solution

Oracle Site Guard that makes DR operations simple, reliable, testable, & repeatable.

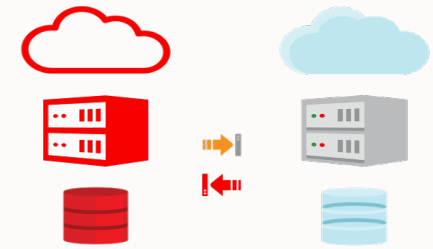


# Oracle Maximum Availability Architecture (MAA)

Standardized Reference Architectures for Never-Down Deployments

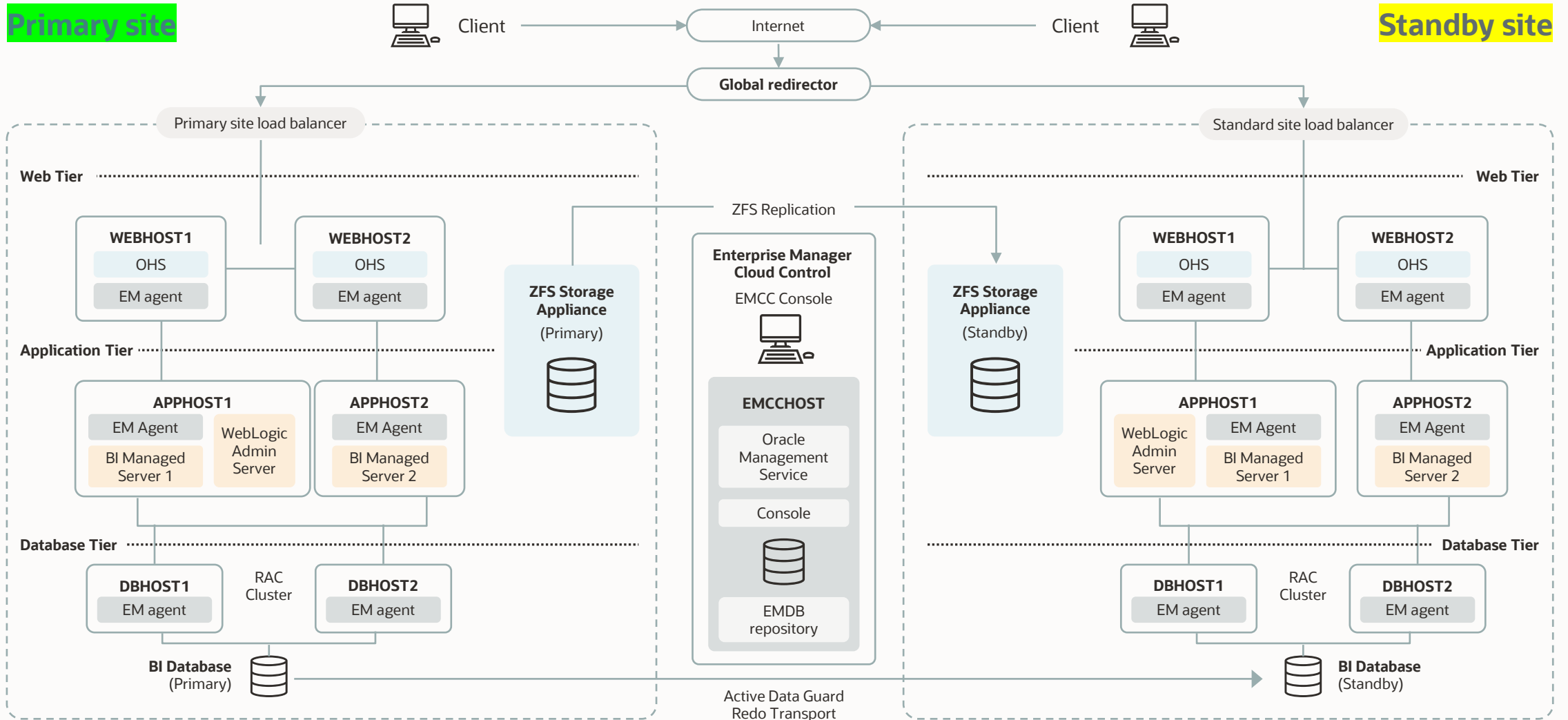


# Oracle Site Guard- Overview



- In Built with Oracle Enterprise Manager. Provide End-to-End DR Automation for total site switchover or failover
  - Orchestrates coordinated Switchover and failover of Oracle Fusion Middleware, Oracle Databases, Apps Unlimited (i.e. EBS), & Engineered systems and extensible with 3<sup>rd</sup> party infrastructure
- Integrates with underlying replication mechanisms that synchronize primary and standby environments and protect mission critical data
  - Oracle Data Guard for DB and storage replication for file system data external to the Oracle Database
- Employs Enterprise Manager capabilities:
  - Job System for distributed scripting, credential for access control, agents for remote execution, systems for site Definition, EMCLI for command line operations, sepository for schemas
- In can be deployed in On-premises, OCI, Other Cloud providers and Hybrid Cloud model.
- Oracle Site Guard is part of Oracle enterprise manager, and it is licensed with additional enterprise manager packs based on the target servers workload type as below
  - Oracle Database : Database Lifecycle Management Pack
  - Oracle Weblogic : WebLogic Server Management Pack
  - Oracle packaged applications/Non oracle applications: Oracle Configuration Management pack for applications

# Oracle Site Guard- Blueprint



# Oracle Site Guard—Key features

- Simplified management for site level disaster recovery workflow
  - Provides for both planned switchover & failover
  - Role transitions triggered by administrators
- Integrates with Data Guard Broker for Oracle databases
  - Storage replication supported as well
- Integrates with storage replication for file system artifacts
  - Oracle binaries/configuration/data
  - Applications binary/configuration/data
- Out-of-the-box support for ZFS Storage Appliance
  - Well-defined call outs to integrate with 3rd party storage replication
- Mechanism to integrate with other DR operations
  - Load balancer configuration, Initiate DNS push, etc





## Oracle Site Guard—Key features (Cont'd)

- Implemented as EM deployment procedures
  - Command line and graphical user interface
- Operations invoked via EMCLI
  - Scriptable as needed
  - Monitoring and error handling through EM console
- Supports all end-to-end DR scenarios supported by Oracle
  - Can be used for topologies with both DB & Middle Tier (i.e. WLS) or Middle Tier alone
  - Specialized OOTB orchestration for EBS & Fusion Apps
  - Runs operations in parallel where possible
  - Offers comprehensive logging and restartable operations
- Scales well as a site grows in terms of number of nodes/instances



# Oracle Site Guard—Key features (Cont'd)

- Standby Site Validation using *Snapshot Database* and *ZFS Clones*
  - Periodic assessment of DR site is extremely critical for any business continuity solution
  - Site Guard now provides an automated framework to open the entire standby site for validation by:
    - Converting physical standby database to snapshot database
    - Creating read/write copies of latest replication snapshot using ZFS clones
  - Existing DR infrastructure is leveraged to run the tests
  - Site Guard also provide framework to run automated tests after the site is open for validation
  - The solution also include required automation to convert the opened site back to standby
- Oracle VM DR
  - This solution is based on VM image replication using ZFS
  - Oracle VM recovery is built on top of OVM's RESTful web service architecture
- DR Step Level Timeouts
- ZFS Replication Gap Analysis
  - Analyze replication SLA breach in any given time interval
- NetApp Data ONTAP MetroCluster Integration



# Site switchover using OEM console

- Switchover of entire site with a single command
- Includes switching over of DB, Storage, Application Server, Web Server
- Executed as EM Deployment Procedure

ORACLE Enterprise Manager Cloud Control 13c

**Provisioning**

**Procedure Activity: SWITCHOVER\_SITE1\_TO\_SITE2 1643270909451**

✓ Elapsed Time: 18 minutes, 17 seconds

Run SWITCHOVER_SITE1_TO_SITE2 1643270909451	Scheduled Jan 27, 2022 8:08:34 AM GMT	Elapsed Time 18 minutes, 17 seconds
Procedure Switchover Site	Start Date Jan 27, 2022 8:08:34 AM GMT	Execution Id D68CCAA3243147FAE053160000AC24F
Owner SYSMAN	Last Updated Jan 27, 2022 8:26:51 AM GMT	
Status Succeeded	Completed Date Jan 27, 2022 8:26:51 AM GMT	

**Procedure Steps**

View ▾ Show All Steps ▾ Selected Steps ×

Selec	Name	Status
<input type="checkbox"/>	▶ Run Prechecks	✓
<input type="checkbox"/>	▶ Run Test Scripts	🔄
<input type="checkbox"/>	▶ Run Custom Precheck Scripts	🔄
<input type="checkbox"/>	▶ Run Primary Global Pre-Scripts	🔄
<input type="checkbox"/>	▶ Run Primary Pre-Scripts	🔄
<input type="checkbox"/>	◀ Stop Primary Site	✓
<input type="checkbox"/>	◀ Run Prechecks	🔄

**Run Database Operation**

Type Parallel	Start Date Jan 27, 2022 8:14:21
Elapsed Time 3 minutes, 14 seconds	Completed Date Jan 27, 2022 8:17:31

S/N	Step Name	Status	Type
1	drdbwimp1b-public.site2.example....	Succeeded	Host



# Site switchover using command line (emcli)

- On Primary Site
  - Stop BI Components
  - Stop Web Server
  - Stop Application Server
- Switchover Storage
- Switchover Database
- On Standby Site
  - Start Application Server
  - Start Web Server
  - Start BI Components

```
$ emcli get_operation_plan_details -name="switchover-to-BISystem2"
```

Step No	Operation	Target	Target Host	Error Mode	Run Mode
1	Run Script	/sgscripts/stopBIComponents.sh	strec01-1	Stop	Enabled
2	Run Script	/sgscripts/stopBIComponents.sh	strec01-2	Stop	Enabled
3	Stop OracleInstance	/etc/ohs/instance1	strec01-3	Stop	Enabled
4	Stop OracleInstance	/etc/ohs/instance2	strec01-4	Stop	Enabled
5	Stop ManagedServer	/BIsystem2/bidomain/bi_server1	strec01-1	Stop	Enabled
6	Stop ManagedServer	/BIsystem2/bidomain/bi_server2	strec01-2	Stop	Enabled
7	Stop NodeManager	/etc/fmw/wlserver_10.3	strec01-1	Stop	Enabled
8	Stop NodeManager	/etc/fmw/wlserver_10.3	strec01-2	Stop	Enabled
9	Stop AdminServer	/BIsystem2/bidomain/AdminServer	strec01-1	Stop	Enabled
10	Run Script	/sgscripts/switchoverstorage.sh	strec02-2	Stop	Enabled
11	Switchover Database	ClusterDatabaseHasun0708_racs1	hasun07	Stop	Enabled
12	Start NodeManager	/etc/fmw/wlserver_10.3	strec02-2	Stop	Enabled
13	Start NodeManager	/etc/fmw/wlserver_10.3	strec04-1	Stop	Enabled
14	Start AdminServer	/etc/fmw/AdminServer	strec02-2	Stop	Enabled
15	Start ManagedServer	/etc/fmw/bi_server1	strec02-2	Stop	Enabled
16	Start ManagedServer	/etc/fmw/bi_server2	strec04-2	Stop	Enabled
17	Start OracleInstance	/etc/ohs/instance1	strec02-3	Stop	Enabled
18	Start OracleInstance	/etc/ohs/instance2	strec02-4	Stop	Enabled
19	Run Script	/sgscripts/startBIComponents.sh	strec02-2	Stop	Enabled
20	Run Script	/sgscripts/startBIComponents.sh	strec04-1	Stop	Enabled

```
$
```



# Oracle Site Guard key functionalities

- Operations
  - Stop/Start Site
  - Switchover/Failover Site
  - Open for Validation/Revert to Standby
  - DR Readiness Checks (Health Checks)
- Integration
  - Loose integration with Storage
  - Oracle Database using Data Guard Broker
- Supported Environment
  - All WLS/FMW components
  - WLS/FMW Based Deployments—Fusion Apps and Customer Developed Apps
  - Commodity hardware
  - Engineered Systems
  - Oracle Sun ZFS Storage
  - Extensible to work with other Storage



# Oracle Site Guard pre checks

- Oracle Site Guard runs comprehensive checks before DR operation
  - ZFS Replication health
  - ZFS lag checks
  - ZFS Replication package
  - Data Guard health
  - Data Guard lag (apply and transport) checks
  - Credential validation
  - Script validations
  - Topology checks
  - Agent and host availability
  - Support to include custom pre check scripts

# Oracle Site Guard operation types

There are 6 types of operation can be performed using Oracle Site Guard, once the Site Configuration is done.

- Site Configuration
  - Site can include DB, Application Server, Web Server, Applications
  - Includes Site creation, EM System creation, Credentials association, Script association
- Start Site
  - Starts all the components of a site in correct order
  - Example of order dependency is DB must be started before Application Server
- Stop Site
  - Stops all the component of site in correct order
- Switchover
  - Reverses the role of the sites
  - Primary site becomes standby, standby site becomes primary
  - Planned operation typically done for Primary Site maintenance or testing

# Oracle Site Guard operations types (Cont'd)

- Failover
  - Converts the standby site into Primary
  - Performed when primary site is no longer available due to an unplanned outage
- Open for Validation
  - Converts the standby site into Operational Site so that it can be tested and validated.
  - Physical Standby to Snapshot Standby DB and ZFS Clones
- Revert to Standby
  - Converts the site which has been opened for validation back to Standby Site.
  - Snapshot Standby to Physical Standby DB and ZFS Clones



# Benefits of Oracle Site Guard

- Develop DR procedure (run book) once and Repeat many times
  - Makes DR operations simple, reliable and testable
- Minimize Mean Time to Repair (MTTR)
  - Reduce Human Errors during failovers (execution and coordination)
  - No application, DBA, replication or infrastructure experts needed onsite when disaster happens
- Increased confidence with true validation
  - No need to rely on failover checklists
  - DR procedures planned and tested
- Inherits all the features of Oracle Enterprise Manager. Easy to use.
- Certified with Oracle Applications like Oracle Fusion Applications, Oracle Middleware, Oracle Databases, Oracle VM and ZFS Storage. Extensible to Non-oracle applications.

# Oracle Site Guard key differentiators

- Extensive pre-Checks
- Schedule comprehensive health Checks
- Centralized Logging, Monitoring and Error management
- Restartable options (Re-run safe as well), timeouts
- Secure credential access for custom Scripts, Role Based Access control
- Parallel Executions (Can scale e.g., Oracle Public Cloud)
- Extensibility, No Staging Scripts on remote Nodes
- Auto Discovery of topology (doesn't need any inputs)
- Dynamic binding of credentials
- Handle topology changes (Scale up, Scale down)
- HA Support for Critical Operations



# Oracle Site Guard best practices

- Implement DR solution as per Oracle recommendation (Refer to [MAA](#) & [Fusion Middleware DR Guide](#))
- Configure Data Guard broker to manage (Active) Data Guard
- Single Enterprise Manager Cloud Control should monitor both primary and standby sites
- Implement EM as per Oracle recommended EM MAA and HA [guidelines](#)
- Run pre checks before performing any DR operation
- Schedule periodic health checks to assert DR readiness of standby site
- Upload all the custom scripts to the EM software library and use them in Site Guard
- Configure SLA's (Redo and Transport Lag) for all database instances
- Oracle Sun ZFS Storage Appliance
  - Configure to assert replication lag (based on SLA)
  - Configure to perform sync before attempting DR operation

# Oracle Site Guard Resources

- [Site Guard Product Page in Oracle.com](#)
- [Oracle Site Guard Documentation](#)
- [Video: Oracle VM Centric DR with Site Guard Through a Switch Over](#)
- [Fusion Middleware Disaster Recovery Guide](#)
- [Oracle Database Maximum Availability Architecture](#)
- [Oracle Application Disaster Recovery using Site Guard](#)
- White Paper: Automating DR using Oracle Site Guard for Oracle Exadata & PCA
  - <http://www.oracle.com/technetwork/database/availability/maa-site-guard-exalogic-exadata-1978799.pdf>

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