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Oracle Site Guard

Automate Business Continuity at Scale

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.

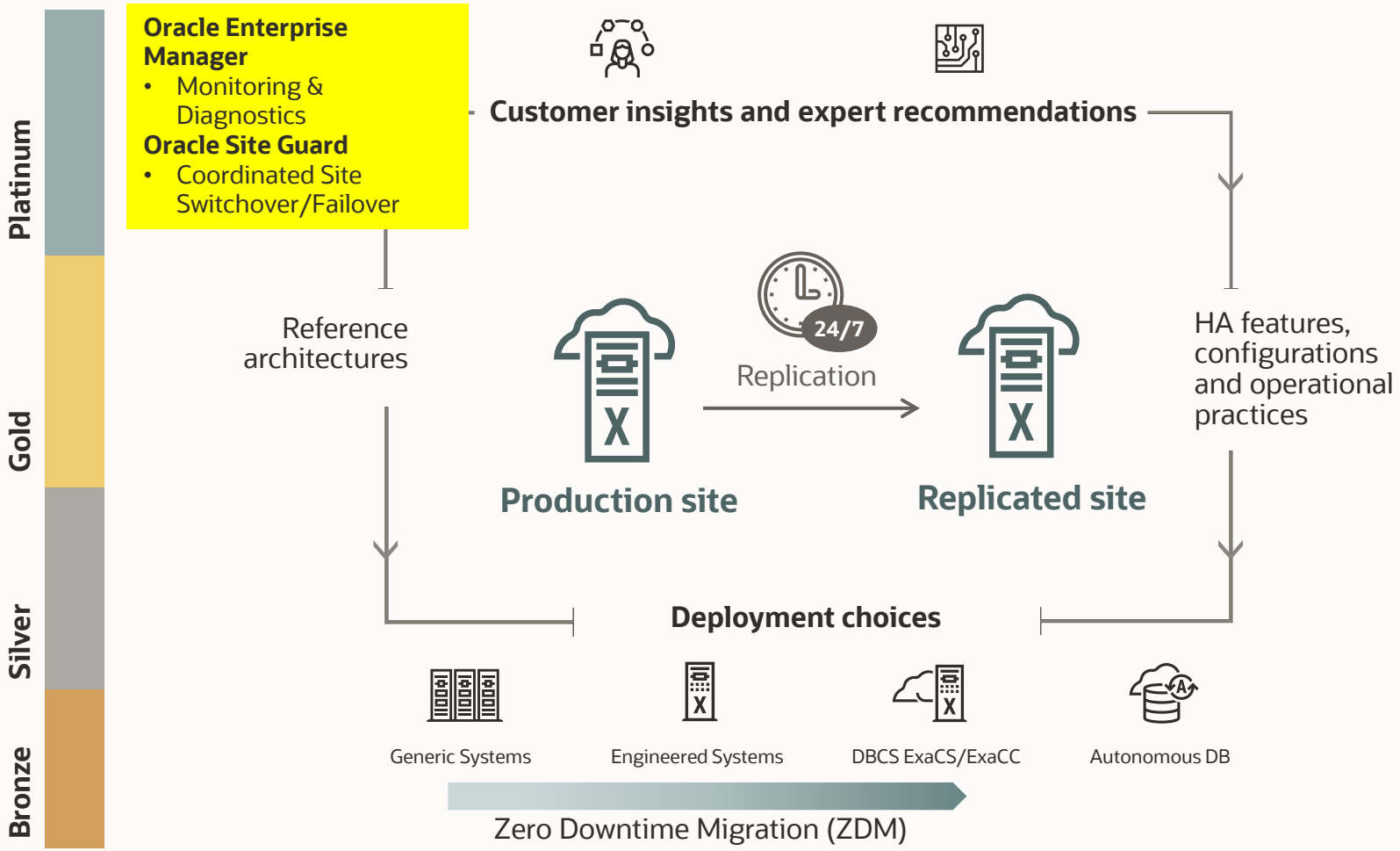
Challenges of business continuity

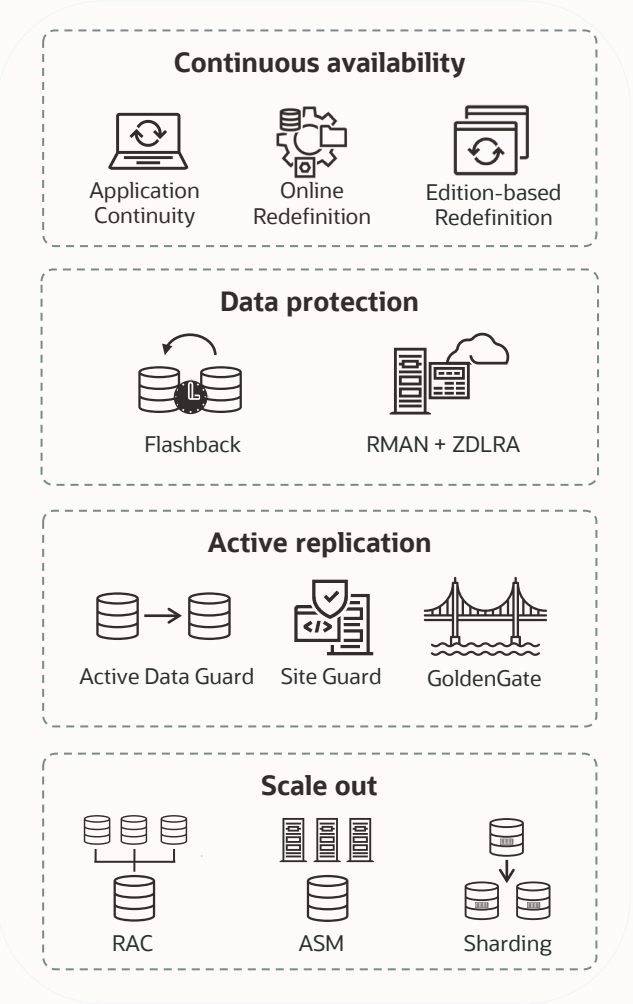
- Application data needs to be replicated to DR site
  - Database (using Data Guard or Active Data Guard)
  - Binaries/Configuration/Data for DB and App (using ZFS or other storage replication technologies)
- Different startup/shutdown procedures for each tier
- Infra stack dependencies and ordering 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.

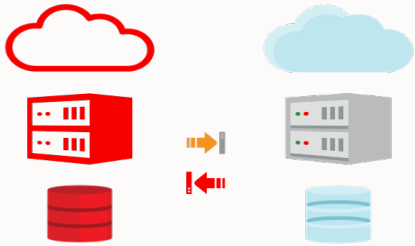
Oracle Maximum Availability Architecture (MAA)

Standardized Reference Architectures for Never-Down Deployments





Oracle Site Guard- Overview



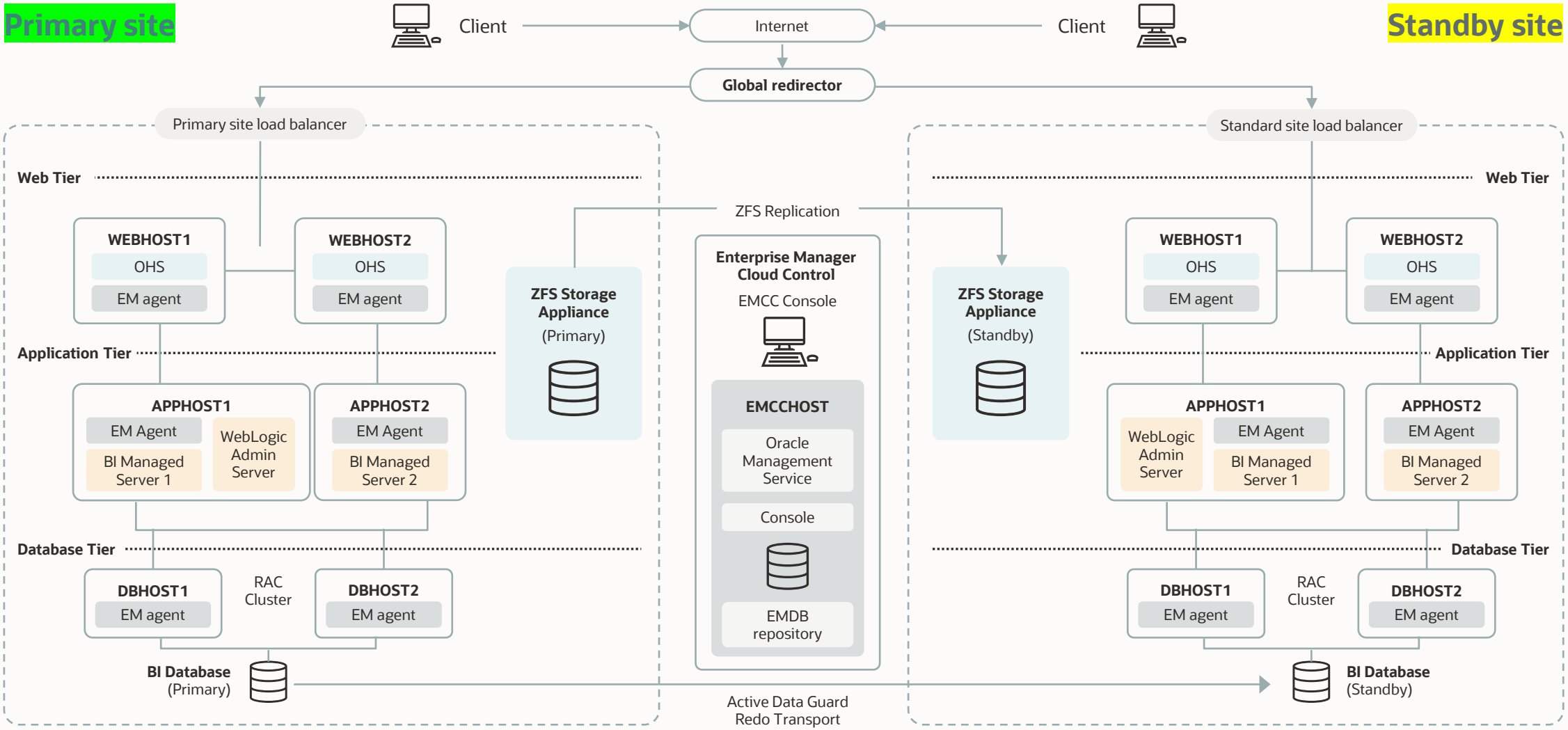
- In Built with Oracle Enterprise Manager. Provide End-to-End DR Automation for total site switchover or failover
  - Orchestrates coordinated Switchover and failover of Oracle Fusion Middleware, Oracle Databases, Apps Unlimited (i.e. EBS), & Engineered systems and extensible with 3rd party infrastructure
- 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)

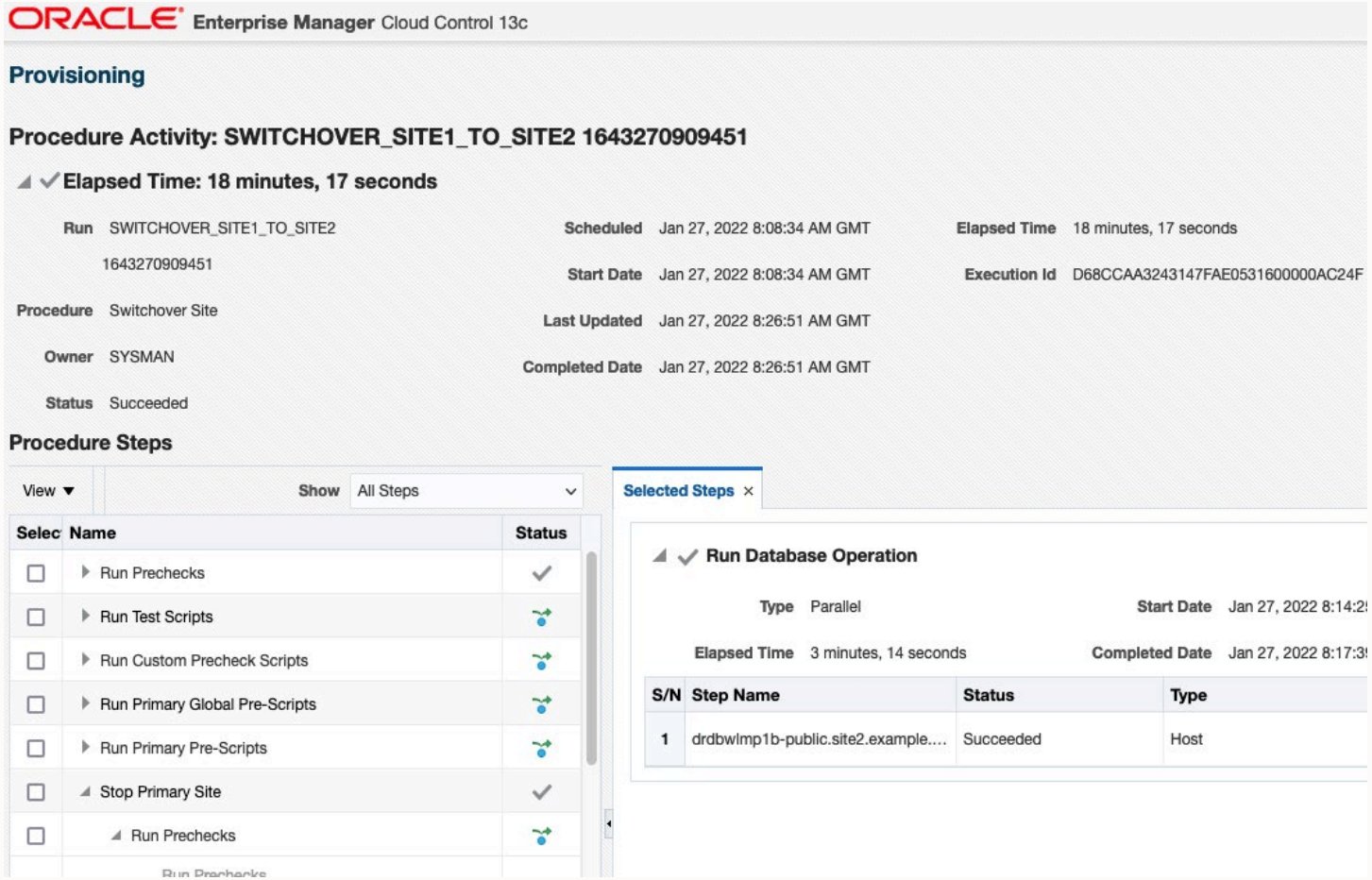
- Implemented as EM deployment procedures
  - Command line and graphical user interface
- Operations invoked via EMCLI
  - Scriptable as needed
  - Monitoring and error handling through EM console
- Supports all end-to-end DR scenarios supported by Oracle
  - Can be used for topologies with both DB & 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



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  Operation             Target                          Target       Error   Run
No                                                        Host         Mode    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), iimeouts
- 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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