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

- Customer insights and expert recommendations
- Reference architectures
- Production site
- Replication
- Replicated site
- Deployment choices
- HA features, configurations and operational practices

**Oracle Enterprise Manager**
- Monitoring & Diagnostics

**Oracle Site Guard**
- Coordinated Site Switchover/Failover

- Continuous availability
  - Application Continuity
  - Online Redefinition
  - Edition-based Redefinition

- Data protection
  - Flashback
  - RMAN + ZDLRA

- Active replication
  - Active Data Guard
  - Site Guard
  - GoldenGate

- Scale out
  - RAC
  - ASM
  - Sharding

- Bronze
- Silver
- Gold
- Platinum

- Generic Systems
- Engineered Systems
- DBCS ExaCS/ExaCC
- Autonomous DB

Zero Downtime Migration (ZDM)
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—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
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