Oracle Site Guard:
Automate Business Continuity

June, 2020
Safe Harbor

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Challenges of Business Continuity

• Application data needs to be replicated to DR site
  • Database (using 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 Data Guard and file system storage replication

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

• End-to-End DR Automation for total site switchover or failover
  • Orchestrates coordinated failover of Oracle Fusion Middleware, Oracle Databases, Engineered systems
  • Extensible to integrate with 3rd party infrastructure components

• Integrates with underlying replication mechanisms that synchronize primary and standby environments and protect mission critical data
  • Oracle Data Guard for Oracle data, 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, Repository for schemas

• Licensed as a part of Enterprise Manager WebLogic Server Management Pack Enterprise Edition and the Oracle Database Lifecycle Management Pack

• Available as EM Cloud Control Plug-in
  • Shipped as part of FMW Plug-in
Oracle Site Guard – Blue Print
Business Continuity Automation for Engineered Systems

With Oracle Site Guard

- Automates DR operations between sites
  - Pre-integrated with the ZFSSA, Oracle FMW for Oracle Exalogic Elastic Cloud Machine
  - Pre-integrated with Oracle Data Guard for Oracle Exadata Database Machine
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 or Middle Tier alone
  • 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
Benefits of Oracle Site Guard

• Develop DR procedure once and Repeat many times
  • Makes DR operations simple, reliable and testable

• Minimize MTTR
  • Reduce Human Errors during failovers (execution and coordination)
  • No application, replication or infrastructure experts needed onsite when disaster happens

• Increased confidence
  • No need to rely on failover checklists
  • DR procedures planned and tested
Oracle Maximum Availability Architecture (MAA)

- **Oracle Enterprise Manager**
  - Monitoring & Diagnostics
  - Site Guard
  - Coordinated Site Failover

- **Customer Insights & Expert Recommendations**

- **Reference Architectures**

- **Production Site**
- **Replicated Site**

- **HA Features, Configurations & Operational Practices**

- **Deployment Choices**
  - Generic Systems
  - Engineered Systems
  - DBCS ExaCS/ExaCC
  - Autonomous DB

- **Continuous Availability**
  - Application Continuity
  - Global Data Services

- **Data Protection**
  - Flashback
  - RMAN + ZDLRA

- **Active Replication**
  - Active Data Guard
  - GoldenGate

- **Scale Out**
  - RAC
  - ASM
  - Sharding
Site Guard Operations

- Site Configuration
  - Site can include DB, Application Server, WebServer, 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
- Failover
  - Converts the standby site in to Primary
  - Performed when primary site is no longer available due to an unplanned outage
Site Switchover Example

- Switchover of entire site with a single command
- Includes switching over of DB, Storage, Application Server, WebServer
- Executed as EM Deployment Procedure
### Example BI Switchover Plan Details

- **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

---

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

<table>
<thead>
<tr>
<th>Step No</th>
<th>Operation</th>
<th>Target</th>
<th>Target Host</th>
<th>Error Mode</th>
<th>Run Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Run Script</td>
<td>/sgscripts/stopBIComponents.sh</td>
<td>strec01-1</td>
<td>Stop</td>
<td>Enabled</td>
</tr>
<tr>
<td>2</td>
<td>Run Script</td>
<td>/sgscripts/stopBIComponents.sh</td>
<td>strec01-2</td>
<td>Stop</td>
<td>Enabled</td>
</tr>
<tr>
<td>3</td>
<td>Stop OracleInstance</td>
<td>/etc/obs/instance1</td>
<td>strec01-3</td>
<td>Stop</td>
<td>Enabled</td>
</tr>
<tr>
<td>4</td>
<td>Stop OracleInstance</td>
<td>/etc/obs/instance2</td>
<td>strec01-4</td>
<td>Stop</td>
<td>Enabled</td>
</tr>
<tr>
<td>5</td>
<td>Stop ManagedServer</td>
<td>/BISystem2/bidomain/bi_server1</td>
<td>strec01-1</td>
<td>Stop</td>
<td>Enabled</td>
</tr>
<tr>
<td>6</td>
<td>Stop ManagedServer</td>
<td>/BISystem2/bidomain/bi_server2</td>
<td>strec01-2</td>
<td>Stop</td>
<td>Enabled</td>
</tr>
<tr>
<td>7</td>
<td>Stop NodeManager</td>
<td>/etc/fmw/wls_server_1.0.3</td>
<td>strec01-1</td>
<td>Stop</td>
<td>Enabled</td>
</tr>
<tr>
<td>8</td>
<td>Stop NodeManager</td>
<td>/etc/fmw/wls_server_1.0.3</td>
<td>strec01-2</td>
<td>Stop</td>
<td>Enabled</td>
</tr>
<tr>
<td>9</td>
<td>Stop AdminServer</td>
<td>/BISystem2/bidomain/AdminServer</td>
<td>strec01-1</td>
<td>Stop</td>
<td>Enabled</td>
</tr>
<tr>
<td>10</td>
<td>Run Script</td>
<td>/sgscripts/switchoverstorage.sh</td>
<td>strec02-2</td>
<td>Stop</td>
<td>Enabled</td>
</tr>
<tr>
<td>11</td>
<td>Switchover Database</td>
<td>ClusterDatabaseHasun0708_racs1</td>
<td>hasun07</td>
<td>Stop</td>
<td>Enabled</td>
</tr>
<tr>
<td>12</td>
<td>Start NodeManager</td>
<td>/etc/fmw/wls_server_1.0.3</td>
<td>strec02-2</td>
<td>Stop</td>
<td>Enabled</td>
</tr>
<tr>
<td>13</td>
<td>Start NodeManager</td>
<td>/etc/fmw/wls_server_1.0.3</td>
<td>strec04-1</td>
<td>Stop</td>
<td>Enabled</td>
</tr>
<tr>
<td>14</td>
<td>Start AdminServer</td>
<td>/etc/fmw/AdminServer</td>
<td>strec02-2</td>
<td>Stop</td>
<td>Enabled</td>
</tr>
<tr>
<td>15</td>
<td>Start ManagedServer</td>
<td>/etc/fmw/bi_server1</td>
<td>strec02-2</td>
<td>Stop</td>
<td>Enabled</td>
</tr>
<tr>
<td>16</td>
<td>Start ManagedServer</td>
<td>/etc/fmw/bi_server2</td>
<td>strec04-2</td>
<td>Stop</td>
<td>Enabled</td>
</tr>
<tr>
<td>17</td>
<td>Start OracleInstance</td>
<td>/etc/obs/instance1</td>
<td>strec02-3</td>
<td>Stop</td>
<td>Enabled</td>
</tr>
<tr>
<td>18</td>
<td>Start OracleInstance</td>
<td>/etc/obs/instance2</td>
<td>strec02-4</td>
<td>Stop</td>
<td>Enabled</td>
</tr>
<tr>
<td>19</td>
<td>Run Script</td>
<td>/sgscripts/startBIComponents.sh</td>
<td>strec02-2</td>
<td>Stop</td>
<td>Enabled</td>
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<tr>
<td>20</td>
<td>Run Script</td>
<td>/sgscripts/startBIComponents.sh</td>
<td>strec04-1</td>
<td>Stop</td>
<td>Enabled</td>
</tr>
</tbody>
</table>
Site Guard Key Functionality

- **Operations**
  - Stop/Start Site
  - Switchover/Failover Site
  - DR Readiness Checks (Health Checks)

- **Integration**
  - Loose integration with Storage
  - Oracle Database using Data Guard Broker

- **Supported Environment**
  - All FMW components
  - FMW Based Deployments – Fusion Apps and Customer Developed Apps
  - Commodity hardware
  - Engineered Systems
  - Oracle Sun ZFS Storage
  - Extensible to work with other Storage
Site Guard Pre Checks

- 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
Site Guard Key Differentiators

- Pre Checks
- Schedule Comprehensive Health Checks
- Centralized Logging, Monitoring and Error Management
- Restart able 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
Site Guard Best Practices

• Implement DR solution as per Oracle recommendation (Refer Fusion Middleware DR Guide)
• Configure Data Guard broker to manage 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 in 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
Resources

- Site Guard Product Page in Oracle.com
- Site Guard Product Guide
- Video: Site Guard Based Disaster Recovery for Private Cloud Appliance (PCA)
- Video: Oracle VM Centric DR with Site Guard Through a Switch Over
- Fusion Middleware Disaster Recovery Guide
- White Paper: Automating DR using Oracle Site Guard for Oracle Exalogic/Exadata
Questions & Answers

http://www.oracle.com/goto/osg