Highly Available, Highly Scalable – Enterprise Manager 12c for Large Enterprises

Sarah Brydon
Agenda

• Paypal, ebay and the ebay inc environment

• Build considerations for a challenging HA environment

• Daily management for thousands of targets

• Reporting from the repository at scale

• Conclusions and future directions
Speaker Qualifications

• DBA from 1996, work with all Oracle versions from 7.1 onwards
• Oracle Certified Master, speaker at OOW and Hotsos, IOUG
  Select author, technical editor for Apress
• Specialist in RAC, 24x7 environments, Oracle security, audit and monitoring
• Senior Member of Technical Staff, Paypal Database Engineering – now part of ebay inc
• Follow me on Twitter at  [@sarah_brydon](https://twitter.com/sarah_brydon)
ebay inc Environment

- ebay inc covers all of Paypal, Paypal Credit, and ebay

- Fast paced VLDB OLTP environment
  - 1000+ database instances across multiple platforms and versions
  - 1500+ Weblogic servers running applications
  - 5,000-12,000 concurrent processes, 240,000 calls/second on largest DB cluster
  - 100s of Goldengate installations
  - 10-30 TB OLTP databases
  - 50-100% database workloads growth annually

- Business is growing rapidly
  - 140,000,000 active accounts
  - Largest Exadata deployment in North America
  - New users, features, transaction
  - New channels: POS, Mobile, etc

How should we monitor all this ???
The business problem - before Enterprise Manager

- Dozens of scripts in shell, perl, python
- Massive maintenance overhead to support them against all of Linux, AIX, Solaris and Oracle 9i to 12c
- Custom repository of collected AWR and metric data reached 3TB in size
- No single source of truth
- As ebay inc expanded to new acquisitions, absorbing existing hosts into ebay inc was challenging
- Managing script versions was difficult across platforms and versions
- Every alert off a metric collected was custom
- Massive learning curve for new hires

BUT
- It was fast, reliable and accurate!
- Provided both real time alerts and daily ‘informational’ emails
### The solution: Oracle Enterprise Manager 12c

<table>
<thead>
<tr>
<th>Customer</th>
<th>Requirement</th>
<th>Before EM</th>
<th>Goal</th>
<th>OEM 12c</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duty officers</td>
<td>• Red lights</td>
<td>• Custom dashboards, manual fix-it</td>
<td>• Real-time dashboards</td>
<td>Console</td>
</tr>
<tr>
<td></td>
<td>• Fix-it automation</td>
<td></td>
<td>• Fix-it automation</td>
<td>✓</td>
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<tr>
<td></td>
<td>• State trends</td>
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<td>• All alerts in Console</td>
<td>✓</td>
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<td></td>
<td></td>
<td></td>
<td>• Trend reports</td>
<td>✓</td>
</tr>
<tr>
<td>Business teams &amp; Managers</td>
<td>Application state, payments, trends</td>
<td>• Combination of sources and tools</td>
<td>• Real-time business dashboards</td>
<td>No/limited</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>• Trend reports</td>
<td>✓</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>• Single source of truth</td>
<td>✓</td>
</tr>
<tr>
<td>Engineering</td>
<td>• Build compliance</td>
<td>• Custom and adhoc scripts</td>
<td>• Extensible metric framework</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>• Standards audit</td>
<td></td>
<td>• Visible, enforceable standards</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>• Right execution</td>
<td></td>
<td>• Templated deployments</td>
<td>✓</td>
</tr>
</tbody>
</table>

- Integrated standards based monitoring across technologies and business units
- Doing the right thing is automated and default
- Built for 10,000 not 1000 – completely scalable
- Oracle provides 1000s of metrics, and a framework for extensions
- Satisfies needs across teams – get support for OEM deployment by finding partners!
- Industry BoB standard allows rapid ramp-up by new hires
Building Highly Available Enterprise Manager

• If you are monitoring highly available systems, you must be just as available.
• Definition of Tier 4
  – OMS on the primary site in Active/Active Configuration. Repository deployed using Oracle RAC.
  – Duplicate hardware deployed at the standby site.
  – DR for OMS and Software Library using Storage Replication between primary and standby sites.
  – Database DR using Oracle Data Guard.
Best Practices for High Availability

• Formerly the DR OMS was recommended to be a standby OMS – from 12.1.0.4 use storage replication
• Give serious thought to capacity of repository and OMS hosts
• Plan for more targets than you think you will need
• Accept the EM standards for your OEM repository build
• Have a pre-production environment to verify patches
• Commit to patching and maintaining EM. Negotiate maintenance and DR test windows before you are live.
Agent Challenges in Secured Environments

– The agent traffic. Full functionality requires bi-directional traffic. Always use SSL
– The agent power. For maximum security do not install the agent with the same user as the database
– Access to MOS from at least one OMS – incredibly useful, is a security concern
– Privilege escalation to access root or even Oracle commands (EM 12c supports powerbroker and sudo).
– Use 12.1.0.4’s improved deployment and patching methods – mass gold image deployment
Management challenges at scale

- The GUI slows down tremendously as the number of targets increases - this is the #1 complaint from eBay Inc DBAs
- Many screens are designed for single select rather than multi-select
- No bulk promotion – discovery leaves you with (thousands) of targets to promote.
- Consider the eBay Inc repository:
  - 7000+ targets spread across RAC, Exadata, Weblogic, standalone RDBMS and Goldengate
  - Still expanding – on track for > 10,000 targets
- When you are operating at this scale, as an integral part of daily operations, you have to consider staffing adequately to maintain the OEM and keep it healthy
- You should allow sufficient staff capacity to do recommended health checks and maintenance
### Recommended Maintenance Tasks

<table>
<thead>
<tr>
<th>TASK</th>
<th>DAILY</th>
<th>BIWEEKLY</th>
<th>MONTHLY</th>
<th>QUARTERLY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Review <strong>critical EM component availability</strong></td>
<td></td>
<td>X</td>
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<tr>
<td>Review <strong>events, incidents and problems</strong> for EM related infrastructure</td>
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<tr>
<td>Review <strong>overall health of the system</strong> including the job system, backlog, load, notifications and task performance</td>
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<tr>
<td>Review <strong>Agent issues</strong> for obvious problems (i.e. large percentage of agents with an unreachable status)</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Review <strong>Agent issues</strong> (deeper/more detailed review of agents with consistent or continual problems)</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Review <strong>metric trending for anything out of bounds</strong></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Evaluate <strong>database (performance, sizing, fragmentation)</strong></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Check for updates in <strong>Self Update</strong> (plug-ins, connectors, agents, etc.) Note that there is an out-of-box ruleset that will provide notification for the availability of new updates.</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Check for recommended <strong>patches</strong></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>
Solution #1: Leverage EMDIAG

(from Operational Considerations and Troubleshooting Oracle Enterprise Manager 12c

EMDIAG
The EMDIAG Toolkit is a set of utilities that collect data from Cloud Control OMS, Repository and Agents to assist in troubleshooting and maintenance. EMDIAG consists of REPVFY, OMSVFY and AGTVFY Tools. Many of the recommendations in this whitepaper will utilize the EMDIAG tools. See EMDIAG Troubleshooting Kits Master Index [421053.1] for more information.

REPVFY
The EMDIAG REPVFY 12c kit is designed to collect data from a Cloud Control Management Repository 12c to assist in the diagnosis and correction of Cloud Control issues. For detailed installation instructions see EMDIAG REPVFY Kit for Cloud Control 12c - Download, Install/De-Install and Upgrade [ID 1426973.1]. For details on utilizing REPVFY see EMDIAG Repvfy 12c Kit - How to Use the Repvfy 12c kit [ID 1427365.1].

OMSVFY
OMSVFY is installed on each OMS server and collects data on the OMS configuration and patches. There are also several utilities available to help in searching log files, zipping the files for transfer to support, and identifying trouble areas on the OMS. See note EMDIAG Omsvfy 12c Kit - Download and Install [ID 1374450.1] for detailed installation instructions.

AGTVFY
AGTVFY gets installed on the each Agent server. This is a good component to become familiar with and use when troubleshooting agent issues. For detailed install instructions see EMDIAG Agtvfy 12c Kit - Download and Install [ID 1374441.1].
Solution #2: Perform Bulk Operations

• Embrace EMCLI and EMCTL
  – EMCLI has command-line, interactive and scripted (Jython) modes
  – Fast and practical for
    • automating daily management
    • bulk maintenance

• Set up a robust group structure so your targets group in useful ways
  – Use dynamic groups for day to day tasks like patching – dynamic groups should have discoverable characteristics
  – Use admin groups for groupings related to business logic, like business unit, lifecycle status etc
Use case: using EMCLI to bulk promote targets

- Use SQL to generate EMCLI commands from the repository

```sql
select
    add_target -name"' || ManagementEntityEO.ENTITY_NAME || "' -Type"'oracle_database'" -Host"' || ManagementEntityEO.HOST_NAME || "' -Credential"'s*Username:dbjmps;password:ppdbjsmp;role:Normal'" || 
    -Properties"'SID:"' || 
    (SELECT PROPERTY_VALUE FROM MGMT_TARGET_PROPERTIES WHERE TARGET_GUID = ManagementEntityEO.ENTITY_GUID AND (UPPER(PROPERTY_NAME) LIKE 'SID')) || 
    'PORT:"' ||  
    (SELECT PROPERTY_VALUE FROM MGMT_TARGET_PROPERTIES WHERE TARGET_GUID = ManagementEntityEO.ENTITY_GUID AND (UPPER(PROPERTY_NAME) LIKE 'PORT')) ||  
    'OracleHome:"' ||  
    (SELECT PROPERTY_VALUE FROM MGMT_TARGET_PROPERTIES WHERE TARGET_GUID = ManagementEntityEO.ENTITY_GUID AND (UPPER(PROPERTY_NAME) LIKE 'ORACLE_HOME') AND UPPER(PROPERTY_NAME) = 'ORACLE_HOME') ||  
    'MachineName:"' || ManagementEntityEO.HOST_NAME || "'";
FROM GC_MANAGEABLE_ENTITIES ManagementEntityEO,MGMT_TARGET_TYPES ManagementEntityTypeEO
WHERE ManagementEntityEO.PROMOTE_STATUS = 1
  AND ManagementEntityEO.MANAGE_STATUS = 1
  AND ManagementEntityEO.ENTITY_TYPE = 'oracle_database'
  AND ManagementEntityEO.ENTITY_TYPE = ManagementEntityTypeEO.TARGET_TYPE
  AND (NOT EXISTS(SELECT 1
    FROM mgt_type_properties mtp
    WHERE mtp.target_type = ManagementEntityEO.entity_type
    AND mtp.property_name = 'DISCOVERY_PKM_OPTOUT'
    AND mtp.property_value = '1' ))
  AND ManagementEntityEO.HOST_NAME Like '%paypa1%'
  AND ManagementEntityEO.ENTITY_NAME Like '%STBY%'
  AND rownum < 11
order by ManagementEntityEO.ENTITY_NAME;
```

Manage MOS in bulk with GC Harvester

• Most enterprises refuse to allow the Oracle collector to run
  – The security risks of a connection to MOS from every host are impossible
• New in EM 12c: GC Harvester centralizes ocm
  – Uploads into MOS straight from your EM repository
  – ocm only on OMS host
• Patch inventories, host details and status immediately available to MOS support
• Can assign CSIs for every target in the environment
  – Con: there is no EMCLI command for assigning CSIs, yet!
Leverage the metric framework to rapidly deploy monitors

• Oracle metric collections can be grouped into templates and applied to your environment to ensure uniform standards
• That framework can easily extended to run any OS, SQL or PL/SQL command and store the result as a custom metric
• Formerly UDMs, now metric extensions
• Built in version control and script deployment
• Can be deployed in a template like any other metric; automatically managed by EM
Use Case - Monitoring HCA port throughput

- Measure data received and transmitted through Host Channel Adaptor ports
- Implemented as multi-column metric extension run by root via OEM
Metric Extension script managed in EM
Leverage the new management features in 12.1.0.4

• Partner agents – a major risk has always been agents going down and losing monitoring.
  – EM 12.1.0.4 each Agent will automatically be assigned a Partner Agent that monitors it.
  – Before 12.1.0.4 EM only indicated “Agent is unreachable”, but with partner agent we can say with affirmation that “Agent is down and host is up”

• Batch agent updates, and jobs to automatically clean up the old agent homes

• The MTM – Manage the Monitor – pages

• Engineered Systems health checks - collects metrics reports based on Exacheck

• If you have security or compliance concerns, look closely at the new security and compliance templates (LifeCycle pack)

• Look at the specialty plugins for managing other enterprise tools like Oracle Vault, Oracle IAM, Database Firewall
Reporting from the OEM Repository

- EM has huge value as a repository of site information
- GC harvestor can share configuration details directly into MOS
- Metrics collected are exposed through Information Publisher – BI Reporter is the next generation
- Some useful templated reports, and more are available on MOS, especially for Exadata
  - TIP: look at Doc ID 1458346.1, perl ./DashboardOperations.pl
  - Automated discovery and creation of an Exadata environment

- Well documented repository makes it easy to extract data
- Metric extensions are managed in the repository tables
- For realtime reports, we have OEM data streaming to all of Tableau, Microstrategy and ElasticSearch with Kibana
Reports

Streaming load distribution

Exadata dashboard

Canary SQL report
Conclusions

- Oracle Enterprise Manager is the future direction of monitoring; gracefully scalable and consistent across the enterprise. But remember -
- Building EM to scale can be challenging.
- Maintenance is key!
- Win hearts and minds in the DBA team
- Find partners in other teams to champion the cause
- Saves hours of DBA time in development of monitoring and management scripts
- Many features not covered in this presentation – DBaaS, AWR Warehouse, Change management etc.
- Oracle Enterprise Manager has to keep evolving to continue offering more value than the open source solutions – take advantage of its rich featureset to enhance the efficiency of your monitoring and management solutions
Notes and thanks

- Ebay inc is pleased to be part of the EM Strategic Customer Program, which has been a valuable partner in helping us leverage Oracle Enterprise Manager 12c

- Useful links for EM include
  - MAA site: http://www.oracle.com/goto/maa

- Whitepapers and MOS notes I refer to regularly include
  - Recommended patch list: 1664074.1: Applying Enterprise Manager 12c Recommended Patches
  - EMDIAG Troubleshooting Kits Master Index (Doc ID 421053.1)
Total Cloud Control

Complete Cloud Lifecycle Management

Expanded Cloud Stack Management

Superior Enterprise-Grade Management

Agile, Automated | Optimized, Efficient | Scalable, Secure
Safe Harbor Statement

The following is intended to outline our general product direction. It is intended for information purposes only, and may not be incorporated into any contract. It is not a commitment to deliver any material, code, or functionality, and should not be relied upon in making purchasing decisions. The development, release, and timing of any features or functionality described for Oracle’s products remains at the sole discretion of Oracle.
Coming together is a beginning; keeping together is progress; working together is success.

Henry Ford

– Akshai Duggal
– Director, EM Strategic Customer Program
Coming together is a beginning; keeping working together is progress; working together is success.

Henry Ford

– Akshai Duggal – Director, EM Strategic Customer Program

About Me
DBA by birth and religion
Managed Ebiz Suite Applications and Databases
Cloud Management of Oracle Public Cloud

My Belief
Automation & Standardization is key to IT Scaling

My Vision
Total transparency of traffic between Clouds
Deployed Highly Available EM
Now What?

...Keep it Oiled
Use Enterprise Manager to Monitor and Manage itself

...... yes we eat our own dog food
The Components that need Oiling
Manage Cloud Control

EM Administrator’s Dashboard

EM Service Health
- OMS
- Agents
- Targets
- Users/Adminstartors

Take Action - Drill down

Provides composite view of all health indicators of EM Service
Manage Cloud Control

Agents getting backoff, where do I start diagnosis?

- Notification Backlog
- Agents Upload Performance
Manage Cloud Control

Are my site Init.ora properties per recommended values?

Has the metric rollup Job completed?

Health of EM Internal DBMS Jobs

DB Size & Properties
Manage Cloud Control

Which is the metric loading maximum data over last month?

Which metric has max collection errors?
Manage Cloud Control

Where has the repository growth been in the last month?

What can I do about it?

Schema Statistics

EM Configurations – Purge Policies & Retentions
Manage Cloud Control

Agents Dashboard

- Availability
- Upload Status
- Monitoring Target details
- Action on Agents to:
  - start /stop
  - Unblock/Block
  - Secure/unsecure
  - Edit properties
  - Resync

Agent is blocked, what do I do?

Agent is lost on a node, restored from backup, but it is still not uploading?
Manage Cloud Control

Is the loader system performing or choking?

Health of all OMSes

Is the job system holding sticky threads?
Manage Cloud Control

Monitor EM Stack like you would any WLS/FMW Instance
Manage Cloud Control

EM Console Performance

Is the workload distributed evenly between OMSes?

Where is the time spent by a poor performing page?
EM - Strategic Customer Program (EM SCP)

**Trusted Advisor to Your EM Project Team**
- Dedicated EM Engineering and Business Development Resources
- Deliver specific technical assistance for successful deployment of Enterprise Manager Cloud Control 12c and Management Pack
- Follow **Fast Track Methodology** to help you succeed in your business

**EM SCP commitment**
- Assume a stakeholder position in your production project success
- Facilitate production status mapped to the your project plan
- Provide customer experience feedback directly to Development; elevate customer relationships with development
- Promote SCP production customers as a reference
# Enterprise Manager Sessions – Thursday, October 2nd

<table>
<thead>
<tr>
<th>ID</th>
<th>Title</th>
<th>Time</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>CON2561</td>
<td>You’ve Got It; Flaunt It: Oracle Enterprise Manager Cloud Control Extensibility</td>
<td>9:30 AM - 10:15 AM</td>
<td>Marriott Marquis - Golden Gate C3</td>
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<td>CON7940</td>
<td>Building an On-Premises Java Cloud: Oracle WebLogic Server and Oracle Enterprise Manager</td>
<td>9:30 AM - 10:15 AM</td>
<td>Moscone South - 200</td>
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<td>CON8243</td>
<td>Oracle Enterprise Manager 12c Security Cookbook: Best Practices for Large Data Centers</td>
<td>9:30 AM - 10:15 AM</td>
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<td>CON3028</td>
<td>Enterprise Architecture Approach to Developing a DBaaS Private Cloud at Boeing</td>
<td>9:30 AM - 10:15 AM</td>
<td>Moscone South - 301</td>
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<td>CON8184</td>
<td>What’s New and Best Practices for Oracle Data Masking and Subsetting</td>
<td>9:30 AM - 10:15 AM</td>
<td>Moscone South - 306</td>
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<td>CON5451</td>
<td>Highly Available, Highly Scalable: Oracle Enterprise Manager 12c for Large Enterprises</td>
<td>10:45 AM - 11:30 AM</td>
<td>Marriott Marquis - Golden Gate C3</td>
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<td>CON4114</td>
<td>Advanced Diagnostics and Monitoring with Oracle Enterprise Manager 12c</td>
<td>10:45 AM - 11:30 AM</td>
<td>Moscone South - 301</td>
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</table>
## Enterprise Manager Sessions – Thursday, October 2nd

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<tr>
<td>CON2699</td>
<td>Oracle Exadata’s Exachk and Oracle Enterprise Manager 12c: Keeping Up with Oracle Exadata</td>
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<td>CON4448</td>
<td>PDBaaS with Oracle Enterprise Manager 12c</td>
<td>12:00 PM - 12:45 PM</td>
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<td>CON10038</td>
<td>Customer Panel: Private Cloud Consolidation, Standardization, and Automation</td>
<td>12:00 PM - 12:45 PM</td>
<td>Moscone South - 301</td>
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<td>CON8244</td>
<td>Manage the Manager: Tips on How to Best Manage Oracle Enterprise Manager 12c</td>
<td>1:15 PM - 2:00 PM</td>
<td>Marriott Marquis - Golden Gate C3</td>
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<tr>
<td>CON8015</td>
<td>Security Compliance and Data Governance: Dual Problems, Single Solution</td>
<td>1:15 PM - 2:00 PM</td>
<td>Moscone South - 301</td>
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<td>CON7718</td>
<td>Managing and Monitoring Oracle GoldenGate</td>
<td>1:15 PM - 2:00 PM</td>
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<td>CON7697</td>
<td>Oracle Enterprise Manager 12c Cloud Control for Managing Oracle E-Business Suite 12.2</td>
<td>1:15 PM - 2:00 PM</td>
<td>Moscone West - 2018</td>
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<td>CON6083</td>
<td>Real-World Operation Excellence with Oracle Enterprise Manager 12c: Taking It to the Next Level</td>
<td>2:30 PM - 3:15 PM</td>
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<td>CON8493</td>
<td>Odyssey of DBaaS: A UBS Story</td>
<td>2:30 PM - 3:15 PM</td>
<td>Moscone South - 301</td>
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## Enterprise Manager One Hour Hands-On Labs

**Thursday 10/2 at Hotel Nikko**

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<thead>
<tr>
<th>ID</th>
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<tr>
<td>HOL9484</td>
<td>Maximizing Oracle Database 12c Performance with Oracle Enterprise Manager</td>
<td>10:00 – 11:00</td>
<td>Carmel</td>
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<td>HOL9509</td>
<td>Oracle Enterprise Manager 12c: Oracle WebLogic Server and SOA Diagnostics and Administration</td>
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<td>Nikko Ballroom I</td>
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<tr>
<td>HOL9528</td>
<td>Private Cloud Self-Service, Oracle Fusion Middleware PaaS with Oracle Enterprise Manager 12c</td>
<td>01:00 – 02:00</td>
<td>Nikko Ballroom I</td>
</tr>
</tbody>
</table>