Oracle WebLogic Server: Automated and Simplified Management in a World of Clouds

CON8634

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Safe Harbor Statement

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Top CIO Priorities

- Embrace Cloud
- Innovate Fast
- Consolidate & Optimize
- Maintain Business Continuity
- Leverage DevOps

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Oracle WebLogic Server 12.1.3

- **Developer Productivity**
  - Java EE 6, JDK 7 and 8, Multiple IDEs, Maven
  - Selected Java EE7 - JSON, REST, WebSocket, JPA

- **High Availability and Performance**
  - DB 12c integration, high availability enhancements, Exalogic optimizations

- **Cloud-Scale Management and Operations**
  - Dynamic clusters, REST, FMW Control, Enterprise Manager, Managed Coherence Servers

- **Available in Java Cloud Service**

- **Docker Certification**

- **Upgrade from prior versions**
WebLogic Docker Images

• Base Image
  – Oracle Linux or Red Hat (on Docker Hub)

• Install Image
  – Download WebLogic installers and JDK
  – WebLogic Dockerfiles to extend base image with JDK and WebLogic Server installation

• Domain Image
  – Sample Dockerfile posted on GitHub to extend install image to create a domain configuration

https://github.com/oracle/docker/tree/master/OracleWebLogic
Oracle WebLogic Server 12.2.1 REST Management
Performance, Scalability, Usability

Benefits of REST
• Simplicity
• Language agnostic
• No JVM on client side, no WebLogic <-> JMX
• Easy to tunnel through firewalls (HTTP)
• Current tech trend (eg. mobile dev)

REST Management in WLS
• Comprehensive
  • Dynamically generated interfaces
  • Async/sync
  • Admin server and managed servers
• Performance and Scalability
  • Consolidated query and local processing
  • Faster response times (5x-10x)
## REST Endpoints

Sort by **Task**  **Path**  **Method**  **Group by API**

### Service Instances

Manage the life cycle of your Oracle Java Cloud Service instances.

<table>
<thead>
<tr>
<th>Task</th>
<th>Method</th>
<th>Path</th>
</tr>
</thead>
<tbody>
<tr>
<td>Create a Service Instance</td>
<td>POST</td>
<td>/paas/service/jcs/api/v1.1/instances/[identityDomainId]</td>
</tr>
<tr>
<td>Delete a Service Instance</td>
<td>PUT</td>
<td>/paas/service/jcs/api/v1.1/instances/[identityDomainId]/[serviceId]</td>
</tr>
<tr>
<td>Stop and Start a Service Instance</td>
<td>POST</td>
<td>/paas/service/jcs/api/v1.1/instances/[identityDomainId]/[serviceId]</td>
</tr>
<tr>
<td>View All Service Instances</td>
<td>GET</td>
<td>/paas/service/jcs/api/v1.1/instances/[identityDomainId]</td>
</tr>
<tr>
<td>View a Service Instance</td>
<td>GET</td>
<td>/paas/service/jcs/api/v1.1/instances/[identityDomainId]/[serviceId]</td>
</tr>
<tr>
<td>View the Status of a Service</td>
<td>GET</td>
<td>/paas/service/jcs/api/v1.1/instances/[identityDomainId]/status/[requestName]/job/[jobId]</td>
</tr>
</tbody>
</table>
Oracle WebLogic Server 12.2.1
Automated Elasticity for Dynamic Clusters

Automated Elasticity for Dynamic Clusters

- Administration APIs for Dynamic Clusters
  - Start/stop a specified number of servers
  - Expand/shrink the size of the cluster
- Simple/automated scale up/down or tune
- Rules-based decisions based on capacity demand or schedule
  - Peak Loads, Geographic Patterns, Adding Partitions, Batch Processing, Rebalancing
- Watches, Notifications become Policies, Actions
  - Policies: SmartRules, Calendar-based policies
  - Actions: scaleUp, scaleDown, REST, script
WebLogic Multitenant: Solving Critical Business Challenges

**Microcontainer Portability for DevOps**

- Embrace Cloud
- Leverage DevOps
- Innovate Fast

**3X Consolidation Ratio**

- Embrace Cloud
- Consolidate & Optimize

**Secure/Isolated Multitenant Java**

- Maintain Business Continuity
- Consolidate & Optimize

Oracle

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Microcontainers in WebLogic Server 12.2.1

- Maximum **portability** between environments
- **Parity** between dev and production
- **Fast** startup/shutdown – disposability
- Easy **scale up**
- Enable migration to the **cloud**
High Density/Virtualization

3X Density Improvement

• Lower Total Cost of Ownership of server-side Java Infrastructure
  – Reduce hardware footprint/CAPEX by 66%
  – Reduce OPEX costs by 25%
  – Consolidate domains by 10X

• Simplify with Java Cloud Infrastructure
  – Easy to adopt
  – Elasticity on demand
  – Promotes consistency, quality, and standardization
Isolation for Pluggable Partitions
Independence and Autonomy for Microcontainers

Runtime Isolation
• JDK and WebLogic partnership
• Heap, CPU, threads, requests...

Administrative Isolation
• Admin roles, lifecycle, troubleshooting

Security/Identity Isolation
• Realm, users per partition

Traffic/Data Isolation
• Dedicated JNDI, segregated data
• Dedicated and shared Coherence caches

Innovate
Fast
Maintain
Business Continuity
Consolidate & Optimize
Innovate
Fast
Embrace Cloud

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What’s Coming in Enterprise Manager 13c?

Hybrid Cloud
- Simplify Journey to the Cloud
- True Single Pane of Glass
- Infrastructure Independent PaaS
- Workload Portability

Java Workload Explorer
- DevOps Diagnostics Workbench
- Guided Diagnostics Flows
- Deep JFR Integration
- Heap Memory Diagnostics

Centralized WLS Administration
- Single Console for Multiple Domains
- Named Credentials
- Auditing & Compliance
- WLST Job Scheduler & Monitor

Leverage DevOps
Maintain Business Continuity
Consolidate & Optimize
Innovate Fast
Embrace Cloud
Hybrid Cloud Management
Monitoring, Diagnostics, & Lifecycle Automation via a Single Pane of Glass

• 24/7 monitoring and alerting across On-Premise and PaaS
• Centrally manage, migrate, test and deploy applications
• Complete end-to-end diagnostics with visibility across all application tiers
Hybrid Cloud Management

Upgrade, Move and Manage Through a Single Pane of Glass

Same tool, same skillsets

Faster, easier, lower cost, lower risk

Move database and applications with the push of a button

Monitor and control via single pane of glass

Manage lifecycle including provisioning, compliance and patching

On-Premises & Private Cloud

Oracle Cloud
(Database & Java Cloud Services)
Administer Domains from Single Console
Eliminate need for multiple administration consoles

- Operations exposed in admin consoles integrated into Cloud Control console:
  - Change Center
  - Recording WLST Scripts
  - JDBC Data Source mgmt
  - Configure domain, cluster, server, machine

- Schedule and track process control operations and WLST script execution via predefined jobs

- Integrated Credential management

- Complete System MBean Explorer

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Audit WebLogic Specific Operations

Track who does what and when

- Operations performed from Cloud Control or EM Command Line Interface (EMCLI) will be audited
- Operations to be audited include the following:
  - WebLogic Domain Login
  - WebLogic Domain Logout
  - WebLogic Domain Update/Invoke
- Search audited data by date range, operation, administrator name, status, target name/type, client hostname, message, session, job name/type
- Accessible to super administrators only
- Not enabled out-of-box; enabled via EMCLI verb `update_audit_settings`
WebLogic Drift Management & Continuous Compliance
Ensure Standards are Defined and Maintained 24/7

• Standardization, consolidation and compliance
  – Configuration variations increase risk and support costs
  – Consolidation important step towards cloud
  – Rapidly changing compliance auditing requires reference vs. discrete checks
  – Need for large-scale ongoing configuration/compliance drift management with automated policy violation notifications

• Combine dynamic and automated capability of compliance framework with accuracy and extensibility of configuration comparison.

• New STIG Rules (Version 1, Release 1) for WLS 12c
Log Monitoring, Viewer, and Search

- Remove JRF dependency
  - Optimized to use JMX when JRF exists
  - Using ‘offline mode’ to access log files directly on non JRF domains
  - Offline mode is available regardless if WLS is up or down
- Download log files of all servers in a domain centrally
- Improved UI for Target selection and search by fields
Target Management Best Practices Dashboard

• Exposes wider range of management features for Fusion Middleware management
  – Basic setup (e.g. notifications, groups)
  – Configuration and Compliance Management
  – Provisioning and Patching
  – Monitoring & Diagnostics
  – Synthetic Test Monitoring & SLA Dashboard
  – Administrations

• Provides direct links to access features and feature videos
Java Workload Explorer (JWE)

- The primary interface to the JVMD data
- Refreshed UI
  - Dynamic and snapshot sets
  - Comparison between sets
    - Requests, Call stack, SQLs, Users, ECID, etc.
- New instrumentation
  - Track Time & Resource
  - Improved integration with RUEI
  - Enabled via Dynamic Instrumentation (no JVM command line change) and no restart of servers
- Improved Memory Diagnostics
- Profile by:
  - Requests, applications, sessions or user defined scopes
Coherence Management

• Heat Map view
  – Nodes, Caches, Services, and Hosts views by variety of relevant metrics

• New support for Managed Coherence
  – Discover Coherence as part of WLS domain

• Support for MultiTenancy Clusters

• New and improved Topology viewer

• Coherence Log Viewer
  – Standalone and managed Clusters

• Remove Down Members
  – Streamline removal of obsolete targets
“With the new release of Oracle Enterprise Manager 13c along with the power of Engineered Systems Oracle has taken the work out of building a private cloud. There is no need to wire complex pieces of infrastructure together requiring many high level IT resources. We are able to implement, support, maintain and plan for the future with a single DBA and Middleware administrator from the power cord in the wall all the way to the provisioning button in the self-service portal and beyond, even to monitoring and management of the instances themselves.”

— Brett Curtis, Principal Systems Administrator I – Middleware, IDEXX
Integrated Cloud
Applications & Platform Services
Appendix
## Certification of WebLogic Server on Docker

<table>
<thead>
<tr>
<th>WLS Version</th>
<th>JDK Version</th>
<th>Host OS</th>
<th>Kernel</th>
<th>Docker Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.2.1</td>
<td>8</td>
<td>Oracle Linux 6 UL 6</td>
<td>UEK Release 3 (3.8.13)</td>
<td>1.7+</td>
</tr>
<tr>
<td>12.2.1</td>
<td>8</td>
<td>Oracle Linux 7</td>
<td>UEK Release 3 (3.8.13) or RHCK 3 (3.10)</td>
<td>1.7+</td>
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<tr>
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<td>7/8</td>
<td>Oracle Linux 6 UL 5</td>
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</tr>
</tbody>
</table>
Single bulk request queries to select and return specific subsets of tree

**POST**

## Predefined Smart rules for policies with open parameters

<table>
<thead>
<tr>
<th>Function Name</th>
<th>Group</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>Cluster Low Average Throughput</td>
<td>Cluster</td>
<td>Returns true if the percentage of servers in the cluster satisfying the average Throughput value of the ThreadPoolRuntimeMBean over the specified time interval is larger than the specified fraction.</td>
</tr>
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<td>Cluster High Average Throughput</td>
<td>Cluster</td>
<td>Returns true if the percentage of servers in the cluster satisfying the average Throughput value of the ThreadPoolRuntimeMBean over the specified time interval is larger than the specified fraction.</td>
</tr>
<tr>
<td>Cluster Low Average Pending User Requests</td>
<td>Cluster</td>
<td>Returns true if the percentage of servers in the cluster satisfying the average PendingUserRequestCount value of the ThreadPoolRuntimeMBean over the specified time interval is larger than the specified fraction.</td>
</tr>
<tr>
<td>Cluster High Average Pending User Requests</td>
<td>Cluster</td>
<td>Returns true if the percentage of servers in the cluster satisfying the average PendingUserRequestCount value of the ThreadPoolRuntimeMBean over the specified time interval is larger than the specified fraction.</td>
</tr>
<tr>
<td>Cluster High Average Stuck Threads</td>
<td>Cluster</td>
<td>Returns true if the percentage of servers in the cluster satisfying the average StuckThreadCount value over the specified time interval is larger than the specified fraction.</td>
</tr>
<tr>
<td>Cluster Low Average Thread Pool Queue Length</td>
<td>Cluster</td>
<td>Returns true if the percentage of servers in the cluster satisfying the average QueueLength value of the ThreadPoolRuntimeMBean over the specified time interval is larger than the specified fraction.</td>
</tr>
<tr>
<td>Cluster High Average Thread Pool Queue Length</td>
<td>Cluster</td>
<td>Returns true if the percentage of servers in the cluster satisfying the average QueueLength value of the ThreadPoolRuntimeMBean over the specified time interval is larger than the specified fraction.</td>
</tr>
<tr>
<td>Cluster Low Average Heap Free Percent</td>
<td>Cluster</td>
<td>Returns true if the percentage of servers in the cluster satisfying the average HeapFreePercent condition over the specified time interval is larger than the specified fraction.</td>
</tr>
<tr>
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<td>Cluster</td>
<td>Returns true if the percentage of servers in the cluster satisfying the average HeapFreePercent condition over the specified time interval is larger than the specified fraction.</td>
</tr>
<tr>
<td>Cluster Low Average Idle Threads</td>
<td>Cluster</td>
<td>Returns true if the average number of idle threads in the cluster over the specified interval is less than the specified threshold.</td>
</tr>
<tr>
<td>Cluster High Average Idle Threads</td>
<td>Cluster</td>
<td>Triggers if the average JVM heap free percentage exceeds a specified threshold on some percentage of servers across a cluster.</td>
</tr>
<tr>
<td>Low Average Idle Threads</td>
<td>Server</td>
<td>Returns true if the average number of idle threads over specified interval is less than specified threshold.</td>
</tr>
<tr>
<td>High Average Throughput</td>
<td>Server</td>
<td>Triggers if the average throughput on the local server over the specified interval is greater or equal to specified threshold.</td>
</tr>
<tr>
<td>Low Average Pending User Requests</td>
<td>Server</td>
<td>Returns true if the average number of pending user requests over specified interval is less than specified threshold.</td>
</tr>
<tr>
<td>High System Load Average</td>
<td>Server</td>
<td>Returns true if the average system load over specified interval is greater or equal to specified threshold.</td>
</tr>
<tr>
<td>Low Thread Pool Average Queue Length</td>
<td>Server</td>
<td>Returns true if the average thread pool queue length over specified interval is less than specified threshold.</td>
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<tr>
<td>Low Average Throughput</td>
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<td>Server</td>
<td>Returns true if the average number of pending user requests over specified interval is greater than specified threshold.</td>
</tr>
<tr>
<td>High Average Heap Free Percent</td>
<td>Server</td>
<td>Returns true if percent free heap over the specified time interval is greater or equal to the specified threshold.</td>
</tr>
<tr>
<td>Low Average Stuck Threads</td>
<td>Server</td>
<td>Returns true if the average number of stuck threads over specified interval is greater or equal to specified threshold.</td>
</tr>
<tr>
<td>High Average Stuck Threads</td>
<td>Server</td>
<td>Returns true if the average number of stuck threads over specified interval is greater or equal to specified threshold.</td>
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<tr>
<td>Low System Load Average</td>
<td>Server</td>
<td>Returns true if the average system load over specified interval is less than specified threshold.</td>
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