Oracle Linux Management with Oracle Enterprise Manager 13c Cloud Control

ORACLE WHITE PAPER | MARCH 2017
<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction</td>
<td>2</td>
</tr>
<tr>
<td>Oracle Enterprise Manager 13c overview</td>
<td>2</td>
</tr>
<tr>
<td>Managing Oracle Linux with Oracle Enterprise Manager 13c</td>
<td>3</td>
</tr>
<tr>
<td>Discovery and Inventory</td>
<td>3</td>
</tr>
<tr>
<td>Administration</td>
<td>4</td>
</tr>
<tr>
<td>Patching</td>
<td>4</td>
</tr>
<tr>
<td>Reporting</td>
<td>7</td>
</tr>
<tr>
<td>Configuration files</td>
<td>8</td>
</tr>
<tr>
<td>Provisioning</td>
<td>8</td>
</tr>
<tr>
<td>Monitoring</td>
<td>12</td>
</tr>
<tr>
<td>Operational procedures</td>
<td>13</td>
</tr>
<tr>
<td>Configuration drift analysis</td>
<td>14</td>
</tr>
<tr>
<td>Compliance</td>
<td>15</td>
</tr>
<tr>
<td>Converged systems management</td>
<td>15</td>
</tr>
<tr>
<td>Conclusion</td>
<td>16</td>
</tr>
<tr>
<td>Related Resources</td>
<td>16</td>
</tr>
</tbody>
</table>
Introduction

The Oracle Linux operating system is engineered for open cloud infrastructure. It delivers leading performance, scalability and reliability for enterprise SaaS and PaaS workloads as well as traditional enterprise applications. Oracle Linux Support offers access to award-winning Oracle support resources and Linux support specialists, zero-downtime updates using Ksplice, additional management tools such as Oracle Enterprise Manager, and lifetime support, all at a low cost.

Oracle is the only vendor in the industry that offers a complete Linux-based solution stack—applications, middleware, database, management tools, operating system and hardware—along with a single point of support. Oracle invests significantly in testing Oracle Linux, releasing critical bug fixes faster, enabling enterprises to deploy with confidence.

With Oracle Enterprise Manager 13c, Oracle offers a simple, integrated solution for Linux lifecycle management, from applications to disk.

Oracle Enterprise Manager 13c is system management software that delivers centralized monitoring, administration, and lifecycle management functionality for the complete IT infrastructure, including systems running Oracle and non-Oracle technologies.

An environment may comprise multiple Oracle databases, Oracle Applications and web servers all deployed on operating environments running on physical or virtual servers. It is possible to use the individual product consoles to monitor the status of each of these targets. However, it becomes cumbersome to shuttle between console windows and track the health and security of each of these targets using multiple interfaces.

Oracle Enterprise Manager 13c offers a solution that allows the monitoring and management of the complete Oracle IT infrastructure from a single console. In addition, it provides support for business-driven IT management and business-centric, top-down application management to manage business services, user experience, and infrastructure.

Oracle Enterprise Manager 13c provides an integrated and cost-effective solution for complete Oracle Linux server lifecycle management. Oracle Enterprise Manager 13c delivers comprehensive provisioning, patching, monitoring, and administration capabilities via a single, Web-based user interface, significantly reducing the complexity and cost associated with managing Linux operating system environments on bare-metal physical machines or virtualized environments.

For more information about Oracle Enterprise Manager 13c see Ref 1 at the end of this paper.

Oracle Enterprise Manager 13c overview

Oracle Enterprise Manager 13c provides the most comprehensive management solution for Oracle environments. Key product capabilities include complete cloud lifecycle management, integrated cloud stack management, and business-driven application management. It also provides comprehensive Oracle Linux management capabilities. Oracle Linux Support customers are eligible to use Oracle Enterprise Manager 13c to manage all their Oracle Linux installed servers.

Oracle Enterprise Manager 13c enables administrators to:

• Discover assets within the data center and organize them in patching groups
• Monitor assets
• Provision Oracle Linux
• Manage Oracle Linux patching
• Manage systems compliance to enterprise rules
• Execute operational procedures on a group of servers or on individual servers

Oracle Enterprise Manager 13c easily integrates into an existing Linux patching and provisioning infrastructure because its Linux management is based on open Linux standards (yum patching, PXE boot provisioning).

This paper will show how Oracle Enterprise Manager 13c enables the administrator to accomplish multiple Linux system management tasks securely from a single console.

Managing Oracle Linux with Oracle Enterprise Manager 13c

Figure 1. Oracle Enterprise Manager 13c login console

Discovery and Inventory

Oracle Enterprise Manager 13c launches periodic jobs that scan for unmanaged hosts via a network scan. The discovered hosts can then be promoted to “managed” status by installing and running the Oracle Enterprise Manager agent.

Figure 2. Promote discovered host
Administration

Oracle Enterprise Manager 13c provides administration features for the following areas accessed via the Host target home page > Administration menu:

- Linux Services
- System Run Levels
- Network Cards
- Hosts Lookup Tables
- NFS Client
- User and Group

Figure 3. Host administration feature

Access to these administration features is dependent upon the installation of required packages referenced from this advisory notification. See Ref 2 for the Oracle Linux 6 (OL6) based packages.

Figure 4. Host advisory notification advisory

Patching

Oracle Enterprise Manager 13c provides the following Linux patching features:

- Set up Linux RPM repositories based on Unbreakable Linux Network (ULN) channels
- Download advisories (errata) from ULN
- Set up a Linux patching group to update a group of Linux hosts and collect compliance information
- Allow non-compliant packages to be patched
- Roll back last update/uninstall packages from host
- Manage RPM repositories and channels (clone channels, copy packages from one channel into another, delete channels)
- Add RPMs to custom channels
- Manage configuration file channels (create/delete channels, upload files, copy files from one channel into another)

ORACLE LINUX MANAGEMENT WITH ORACLE ENTERPRISE MANAGER 13C
- Run pre- and post-patching scripts
- Linux Patching Admin and Operator role based access

Oracle Enterprise Manager uses standard RPM repositories under the control of Oracle Enterprise Manager to patch Linux servers.

Figure 5. Linux patching setup

Oracle Enterprise Manager allows the system administrator to create RPM repositories (repo) but also use existing repositories. This enables the administrator to easily mirror repositories from the ULN and use them to patch the Linux servers.

Figure 6. Linux patching setup (continued)

Existing RPM repositories can be defined in Oracle Enterprise Manager as part of the patching setup. Administrators can create their own channels (custom channels) made of specific packages, at a specific patch level using the `createrepo/yum-arch` commands, and then register these custom repositories in Oracle Enterprise Manager.

Figure 7. Manage RPM repositories

For more information on how to manually create mirrors of ULN channels, see Ref 3.
From the Manage RPM Repository section, existing channels can be cloned using the Create-Like feature. The Copy Packages feature allows you to copy packages from one channel to another.

The target servers can be organized in groups that are associated to channels, and periodic scans for updates will be made on the servers of these groups. Managing groups of servers associated with custom channels is an effective way to enforce system image standards. Depending on the purpose of the servers, a set of packages has to be installed and kept up to date on the servers. The administrator creates channels for each group of servers with only the packages that the servers from a particular group need. For example, the database servers with Oracle Database 12c running on Oracle Linux 6 could belong to the group “OL6Host_DB12” with an associated custom channel containing the packages for the installation and execution of Oracle Database. This method helps the administrator maintain a standard in the data center and improves security. In the event the server requires an additional package to be installed, the system administrator would add the package to the custom channel.

Figure 8. Set up patching groups

Once the patching setup is complete, the administrator can select Linux Patching in Enterprise > Provisioning and Linux Patching. Following initialization, it is possible to determine the level of compliance of the systems.

Figure 9. Linux patching
The Compliance Home section provides the administrator with status reports showing which systems need updates. From here, patching can be scheduled and rolled back per patching group. During this process, it is possible to run pre-scripts and post-scripts.

Advisories indicate how critical the various available updates are.

Reporting

Use the reporting features of Oracle Enterprise Manager to run the following Linux patching reports:
- Non-compliant packages for all hosts
- Non-compliant packages for a single host
- Compliance information for all patchable Linux groups
- Compliance information for all patchable Linux hosts

Figure 12. Linux patching reports

Configuration files

Configuration file channels can also be configured by the system administrator to enforce the compliance of the configuration of different systems. For example, general or explicit network configuration files can be deployed to single or multiple host targets with the option to run pre- and postscripts.

Figure 13. Configuration file channels

Provisioning

Oracle Enterprise Manager 13c allows the administrator to provision Oracle Linux on bare-metal servers. While virtual machines can also be provisioned, that is out of the scope of this paper.

Figure 14. Bare metal provisioning
The method used to provision Linux on the bare metal server is standard PXE, HTTP, Kickstart and the use of RPM repositories. The provisioning infrastructure includes a Stage server where the servers installation files are staged, a DHCP server from which the server will get the network information and a Boot server where TFTP boot is configured.

Figure 15. Bare metal provisioning infrastructure

In the Deployment tab, you can add and view bare metal provisioning images.

Figure 16. Bare metal provisioning images

The images consist of a set of information, for example the server MAC address and the Linux installation details used to create the Kickstart file. The following screenshots (Figure 17 though to Figure 21), show how to configure a bare metal provisioning image. As part of the bare metal provisioning flow it is also possible to deploy and configure the Oracle Enterprise Manager agent.
Figure 17. Bare metal provisioning image creation (1 of 5)

Figure 18. Bare metal provisioning image creation (2 of 5)
Figure 19. Bare metal provisioning image creation (3 of 5)

Figure 20. Bare metal provisioning image creation (4 of 5)
Monitoring

Oracle Enterprise Manager 13c provides an incident / event framework that the administrator can use to quickly determine any incident or abnormal activity within the data center.
Operational procedures

Oracle Enterprise Manager 13c provides a library of procedures tailored for specific tasks such as provisioning and patching a database. Administrators can create their own procedures in a shell script or Perl to automate certain operational tasks.
Configuration drift analysis

Oracle Enterprise Manager 13c allows the administrator to compare systems in detail, for example, for compliance purposes or troubleshooting. The following screenshot depicts three systems and reports the differences between them and a reference system from hardware to software configuration.
Compliance

Compliance management provides the ability to evaluate the compliance of targets and systems as they relate to business best practices for configuration, security and storage. The screenshot below depicts the Oracle Generic Framework which provides useful information for monitoring and tracking Linux packages and settings compliance. For example, advice can be given on general security options such as open ports as well as advising of missing patches for Oracle Enterprise Manager and other Oracle products.

![Oracle Generic Compliance Framework](image)

Figure 26. Oracle generic compliance framework

The lifecycle management compliance framework within Oracle Enterprise Manager 13c can also be used for real-time monitoring of files. For example, a custom compliance framework can be created to monitor critical Linux network files (/etc/hosts for example) and alert the user via the framework when these files were edited. Each event can be audited and referenced for future compliance tracking.

![Real-time compliance monitoring of Linux critical network files](image)

Figure 27. Real-time compliance monitoring of Linux critical network files

Converged systems management

Oracle is one of the few enterprise solution providers to offer so many components of the IT infrastructure, from purpose-built engineered systems to general-purpose solutions, Oracle enhances the user experience by tailoring its virtualization and operating system layer to the hardware and applications it provides.

Some IT operations professionals interact with the operating system during system management tasks, while others may only know the operating system as a wrapper around their application.

As development and operations personnel (DevOps) work more closely together within a data center to accelerate IT projects and vendors provide more converged systems infrastructure, the traditional IT roles once held up as the norm are rapidly changing. Oracle Enterprise Manager 13c’s modular design allows users to choose one point of view or the other, or they can select both.
Oracle Enterprise Manager 13c enables customers to have complete visibility into the Oracle Linux environment. If the IT environment consists of a large investment in Oracle hardware, Oracle Enterprise Manager 13c assists with managing the hardware in addition to Oracle Linux to maintain a single view of the Oracle technology stack. If the IT environment is more focused on Oracle Database and Oracle Applications installed across a variety of hardware systems, Oracle Enterprise Manager Cloud Control 13c is the preferred tool to manage the Oracle Linux layer along with the complete Oracle technology stack. A significant percentage of Oracle Linux customers are also Oracle Database and Oracle Applications customers and, therefore, they are most likely already using Oracle Enterprise Manager Cloud Control in some capacity. Many user flows found within Oracle Enterprise Manager Cloud Control assist in that direction.

**Conclusion**

Oracle Enterprise Manager 13c provides the most comprehensive management solution for Oracle environments, including traditional as well as cloud computing architectures. Oracle Enterprise Manager also provides comprehensive Oracle Linux management capabilities, described in detail in this document. These Linux management capabilities are provided to Oracle Linux customers at no additional charge as part of their Oracle Linux Support plans.

**Related Resources**
- **Oracle Linux**
- **Oracle Enterprise Manager**

**References**

|---|---|
Integrated Cloud Applications & Platform Services

Copyright © 2017, Oracle and/or its affiliates. All rights reserved. This document is provided for information purposes only, and the contents hereof are subject to change without notice. This document is not warranted to be error-free, nor subject to any other warranties or conditions, whether expressed orally or implied in law, including implied warranties and conditions of merchantability or fitness for a particular purpose. We specifically disclaim any liability with respect to this document, and no contractual obligations are formed either directly or indirectly by this document. This document may not be reproduced or transmitted in any form or by any means, electronic or mechanical, for any purpose, without our prior written permission.

Oracle and Java are registered trademarks of Oracle and/or its affiliates. Other names may be trademarks of their respective owners.

Intel and Intel Xeon are trademarks or registered trademarks of Intel Corporation. All SPARC trademarks are used under license and are trademarks or registered trademarks of SPARC International, Inc. AMD, Opteron, the AMD logo, and the AMD Opteron logo are trademarks or registered trademarks of Advanced Micro Devices. UNIX is a registered trademark of The Open Group. 0116

Oracle Linux Management with Oracle Enterprise Manager 13c
March 2017
Authors: Simon Hayler and Gregory Verstraeten

Oracle is committed to developing practices and products that help protect the environment