

Oracle® Fusion Middleware

Patching with OPatch



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The Oracle logo, consisting of a red square with the word "ORACLE" in white, uppercase letters inside.

ORACLE®

Oracle Fusion Middleware Patching with OPatch, 12c (12.2.1.3)

E95490-06

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Preface

This document describes how to use OPatch to patch an Oracle Fusion Middleware environment.

Audience

This document is intended for administrators who are responsible for patching Oracle Fusion Middleware.

Documentation Accessibility

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Access to Oracle Support

Oracle customers that have purchased support have access to electronic support through My Oracle Support. For information, visit <http://www.oracle.com/pls/topic/lookup?ctx=acc&id=info> or visit <http://www.oracle.com/pls/topic/lookup?ctx=acc&id=trs> if you are hearing impaired.

Conventions

The following text conventions are used in this document:

Convention	Meaning
boldface	Boldface type indicates graphical user interface elements associated with an action, or terms defined in text or the glossary.
<i>italic</i>	Italic type indicates book titles, emphasis, or placeholder variables for which you supply particular values.
monospace	Monospace type indicates commands within a paragraph, URLs, code in examples, text that appears on the screen, or text that you enter.

1

Patching Your Environment Using OPatch

The OPatch utility provides several commands that you can use to apply and roll back patches to Oracle software in your Oracle Fusion Middleware environment. For more information about using OPatch commands in an Oracle Fusion Middleware environment, see the following topics:

About OPatch

OPatch is a Java-based utility that runs on all supported operating systems and requires installation of the Oracle Universal Installer. It is used to apply patches to Oracle software.

The following topics provide more information about OPatch for Oracle Fusion Middleware:

Type of Patches Used with OPatch

Oracle provides several types of patches that you can use to patch your Oracle software with OPatch.

 **Note:**

Oracle has recently implemented a new patch nomenclature for Oracle products. The new patch names, as well as the previous Oracle Fusion Middleware 11g names, are provided for reference.

Table 1-1 Patches that can be used with OPatch

New Name	Previously Used Name(s)	Description
Interim patch	PSE MLR Exception release One-Off x-fix Hotfix Security One-Off	A patch that contains one or more fixes made available to customers who cannot wait until the next patch set or new product release to get a fix.
Bundle patch	Maintenance pack Service pack MLRs Cumulative patch Update release Bundle patch	An iterative, cumulative patch that is issued between patch sets. Bundle patches usually include only fixes, but some products may include minor enhancements. Examples are the Database Windows bundles and SOA bundle patches.

Table 1-1 (Cont.) Patches that can be used with OPatch

New Name	Previously Used Name(s)	Description
Security Patch Update (SPU)	Critical Patch Updates (CPUs)	<p>An iterative, cumulative patch that consists of security fixes. Formerly known as CPU.</p> <p>Note: The program name which delivers SPUs will still be referred to as Critical Patch Update, as defined below:</p> <p>Critical Patch Update: Oracle's program for quarterly release of security fixes. Patches released as part of this program may be Patch Set Updates, Security Patch Updates, and Bundle Patches. Regardless of the patch type, the patches are cumulative.</p>
Patch Set Updates (PSU)		<p>Patch Set Updates are used to patch Oracle WebLogic Server only. Patch Set Updates are released on a quarterly basis, following the same schedule as the CPUs. These CPUs are released on a Tuesday closest to the 15th of the month, during the months of January, April, July, and October. Patch Set Update content is intended to address the top fifty critical bugs that affects the broad customer base.</p>

Information for Oracle WebLogic Server Smart Update Users

Smart Update is a standalone Java application through which you upgrade the software installations quickly and easily with maintenance patches and maintenance packs. For Oracle Fusion Middleware 12c, Smart Update is no longer supported.

In the previous releases of Oracle WebLogic Server, you could patch your Oracle WebLogic Server software by using a utility called Smart Update. In Oracle Fusion Middleware 12c, Oracle WebLogic Server users can use OPatch to apply patches for both Oracle WebLogic Server and for Oracle Fusion Middleware.

OPatch offers few similar features as Smart Update, but it has a different set of commands and command options. Use this guide to get familiar with OPatch.

Preparing to Use OPatch

To ensure successful patching, complete these prerequisites to prepare your environment to run OPatch, such as obtaining the latest version of OPatch, obtaining required patches from My Oracle Support, and backing up the Oracle home.

For more information on preparing your environment, see the following topics:

Locating and Obtaining the Latest Version of OPatch

Before you run OPatch, find the OPatch utility in the Oracle home, and verify that you have the latest version.

Locating and Running OPatch in the Oracle Fusion Middleware Oracle Home

You can find and run the OPatch utility in the `ORACLE_HOME/OPatch` directory after you install any Oracle Fusion Middleware product.

To run OPatch, run the `opatch` command in this directory.

For example, to view the list of commands available for OPatch on a Unix system, enter the following:

```
./opatch -help
```

On Windows systems, run the following command:

```
opatch.bat -help
```

Identifying the Version of OPatch Included with Oracle Fusion Middleware 12c

Oracle Fusion Middleware 12c (12.2.1.3.0) includes OPatch version 13.9.1.0.0. This version includes new features and capabilities that are designed to improve the experience of patching an Oracle Fusion Middleware 12c Oracle home. A new OPatch version 13.9.2.1.1 is available, but this version of the patch is not supported for the Oracle Fusion Middleware software.

In general, there is a version of OPatch available for each version of the Oracle Universal Installer software.

 **Note:**

The Oracle Fusion Middleware customers must use the OPatch version in Oracle Home, and must move to a different version only when stated by the support team.

To identify the version of OPatch:

1. Change directory to the following directory:

```
cd ORACLE_HOME/OPatch/
```

2. Run the following command:

```
./opatch version
```

For example:

```
./opatch version  
OPatch Version: 13.9.1.0.0  
  
OPatch succeeded.
```


Obtaining Patches Required for Your Installation

You can search for and download the patches required for your installation from My Oracle Support.

My Oracle Support:

<http://support.oracle.com>

After you sign in to My Oracle Support, click the **Patches & Updates** tab, which provides various tools that allow you to quickly locate the patches important to your Oracle software installation.



Note:

Review the README file that is included with each patch. The README file includes important information about the requirements and procedures for applying the patch.

OPatch Environment Variables for Fusion Middleware

Before you run OPatch, ensure that you set the ORACLE_HOME environment variable.

OPatch uses the ORACLE_HOME environment variable to identify the Oracle home that you are planning to patch.

Backup and Recovery Considerations for Patching

It is highly recommended that you back up the Oracle home before any patch operation. You can back up the Oracle home using your preferred method.

You can use any method such as `zip`, `cp -r`, `tar`, and `cpio` to compress the Oracle home.

If the Oracle home does not appear when you execute the `opatch lsinventory -detail` command, the Oracle home might be missing from the Central Inventory, or the Central Inventory itself could be missing or corrupted.

If the Oracle home is listed when you execute the `opatch lsinventory -detail` command, but the products and components within the Oracle home are not listed, the inventory within the Oracle home (local inventory) might be missing or corrupted.

If the Oracle home is backed up and the local inventory is corrupted or lost for some reason, you must restore the entire Oracle home. If a backup does not exist, you may have to reinstall the software.

Using OPatch to Patch Oracle Fusion Middleware

Use OPatch to perform the necessary steps for applying a patch to an Oracle home.

The following topics describe how to use OPatch to patch Oracle Fusion Middleware:

Summary of the Steps For Using OPatch in a Fusion Middleware Environment

Applying a patch with OPatch involves a series of steps that must be performed to ensure successful patching.

The following table summarizes the typical steps required to patch your existing Fusion Middleware environment using OPatch.

Table 1-2 Using OPatch with Oracle Fusion Middleware

Task	Description	Documentation
Acquire patches required for your installation.	Log in, search for, and download the patches required for your specific installation.	Obtaining Patches Required for Your Installation
Review the <code>README.txt</code> file for the patch.	Each patch archive includes a README file that contains important information and instructions that must be followed prior to applying your patch. It is important to review the README file because it provides any unique steps or other information specific to the patch.	The <code>README.txt</code> file that is packaged within the patch archive
Check for patch prerequisites.	The OPatch <code>apply -report</code> command identifies that the prerequisites for the patch have been met.	Verifying the Prerequisites for a Patch
Apply the patch.	After you determine the Oracle home to which you need to apply the patch, and you have read the README file, then you can apply the patch with the <code>opatch apply</code> command.	Examples of Applying and Rolling Back Patches Using OPatch
Verify that the patch was applied to the Oracle home successfully.	The OPatch <code>lsinventory</code> command shows what patches have been applied to the Oracle home. Use this command to verify the application of the patch.	Using the OPatch <code>lsinventory</code> Command to Verify the Patches Applied to an Oracle Home
Verify that your software runs properly after you apply the patch.	After the patching is complete and your servers are restarted, check your product software to verify that the issue has been resolved.	Verifying the Installation after Applying a Patch
Troubleshoot the application of a patch.	If there are problems applying a patch, your first troubleshooting task is to review the log file for the OPatch session.	Troubleshooting a Patch by Viewing the OPatch Log File
Roll back the application of a patch.	If for some reason the result is not satisfactory, you can use the <code>opatch rollback</code> command to remove the patch from the Oracle home. If additional assistance is required, go to My Oracle Support (formerly OracleMetaLink).	Rolling Back a Patch You Have Applied

Common OPatch Commands When Patching an Oracle Fusion Middleware Oracle Home

OPatch provides several commands that you can use to apply, roll back, and verify a patch for an Oracle home. You can use OPatch to apply and roll back a single patch or multiple patches.

Table 1-3 Common OPatch Commands Used When Patching an Oracle Fusion Middleware Environment

Command	Description	Example
<code>opatch apply</code>	This command applies an interim patch to an Oracle home from the current directory. The <code>ORACLE_HOME</code> environment variable must be set to the Oracle home to be patched.	Verifying the Prerequisites for a Patch Applying a Single Patch Using the Apply Command
<code>opatch napply</code>	This command applies multiple patches.	Applying Multiple Patches Using the OPatch napply Command
<code>opatch lsinventory</code>	This command lists the inventory for a particular Oracle home, or displays all installations that can be found. This command does not have any required options.	Using the OPatch lsinventory Command to Verify the Patches Applied to an Oracle Home
<code>opatch rollback</code>	This command removes an existing one-off patch from the appropriate Oracle home directory indicated by the reference ID.	Rolling Back a Patch You Have Applied
<code>opatch nrollback</code>	This command rolls back multiple interim patches at the same time.	Rolling Back Multiple Patches You Have Applied

Examples of Applying and Rolling Back Patches Using OPatch

After you obtain the patches required for your installation, use the appropriate OPatch commands to verify any patch prerequisites, apply a patch to an Oracle home, and if necessary, roll back the application of a patch.

The following topics provide some examples of using OPatch to patch an Oracle Fusion Middleware installation:

Verifying the Prerequisites for a Patch

You can use the `checkApplicable` command as a prerequisite check before applying a patch. This command will check whether a given patch is applicable to one or more Oracle homes.

For a Fusion Middleware installation, OPatch will look for Product directories present under the Oracle home and registered with a single defined central inventory.

If the environment variable `MW_HOME` (or) 'mw_home' option is not defined and the `ORACLE_HOME` environment variable or 'oh' option is also not defined, OPatch will run the `checkApplicable` command on the applicable Oracle home.

If the `ORACLE_HOME` environment variable is defined or the 'oh' option is given, OPatch will run the command on the referenced Oracle home with precedence given to the 'oh' option.

The following are examples of patches not applicable:

- Patches requiring components that are not installed in the Oracle home (or) installed but not of the same version.
- Files mentioned by patch metadata that could not be patched.

The syntax for the `checkApplicable` command is shown below:

```
opatch checkApplicable [-ph patch_location]
                        [-allhomes ]
                        [-invPtrLoc <Path to oraInst.loc file> ]
                        [-mw_home <Path of the Oracle home> ]
                        [-oh <Path of the reference Oracle home> ]
```

Table 1-4 Options for the OPatch `checkApplicable` Command:

Options	Description
<code>-allhomes</code>	This option will override all other options involved in the logic of getting the homes for the test of 'checkApplicable'. This option ensures that the check is applied only to all the registered homes in central inventory.
<code>-invptrloc</code>	This option is used to locate the <code>oraInst.loc</code> file. Needed when the installation uses the <code>-invPtrLoc</code> flag. This should be the path to the <code>oraInst.loc</code> file.
<code>-mw_home</code>	Indicates the path of the Oracle home. This value takes precedence over <code>MW_HOME</code> environment variable.
<code>-oh</code>	Indicates the oracle home to work on. This value takes precedence over the environment variable <code>ORACLE_HOME</code> . This option also ensures that the command runs only on this Oracle home.
<code>-ph</code>	Indicates the location of the patch for which you want to run the <code>checkApplicable</code> command. If not specified, the patch in the current directory is used.

Using the `-report` option

To verify that a patch can be applied to a specific Oracle home, you can also use the `-report` option with the `opatch apply` command. This option will execute all the prerequisite checks including `checkApplicable`.

For example:

```
opatch apply path_to_patch_directory -report
```

This command displays the actions that are taken by the patch, but does not actually apply the patch. As a result, it allows you to verify that the prerequisites for the patch have been met.

Applying a Single Patch Using the Apply Command

To apply a single patch to an Oracle Fusion Middleware Oracle home, use the `opatch apply` command.

Example 1-1 shows how to use the `opatch apply` command to apply a patch to an Oracle Fusion Middleware Oracle home.

This example assumes that:

- The patch you have downloaded has been saved to a directory that is named for the patch number in My Oracle Support. In this case, the patch number is 15941858.
- Change the directory to the patch directory and then run the OPatch apply command. Alternatively, you can run the OPatch command from the `ORACLE_HOME/OPatch` directory and include the location of the patch as an argument to the command. For example:

```
opatch apply /opt/patches/15941858/
```

- The OPatch directory is already included in the PATH variable on the host computer.

Example 1-1 Using the OPatch apply Command to Apply a Patch to an Oracle Fusion Middleware Oracle Home

```
> cd /opt/patches/15941858
> opatch apply
Oracle Interim Patch Installer version 13.9.1.0.0
Copyright (c) 2016, Oracle Corporation. All rights reserved.

Oracle Home      : /opt/Oracle/products/fmw12c
Central Inventory : /opt/Oracle/oraInventory
  from           : /var/opt/Oracle/oraInst.loc
OPatch version   : 13.9.1.0.0
OUI version      : 13.9.1.0.0
Log file location: /opt/Oracle/products/fmw12c/cfgtoollogs/opatch/
opatch2016-09-19_08-09-15AM_1.log

OPatch detects the Middleware Home as "/opt/Oracle/products/fmw12c"

Verifying environment and performing prerequisite checks...
OPatch continues with these patches: 15941858

Do you want to proceed? [y|n]
Y
User Responded with: Y
All checks passed.

Please shutdown Oracle instances running out of this ORACLE_HOME on the local system.
(Oracle Home = '/opt/Oracle/products/fmw12c')

Is the local system ready for patching? [y|n]
Y
User Responded with: Y
Backing up files...
Applying interim patch '15941858' to OH '/opt/Oracle/products/fmw12c'

Patching component oracle.wls.core.app.server 12.2.1.3.0...
```

```
Patching component oracle.wls.core.app.server 12.2.1.3.0...
Patch 15941858 successfully applied
Log file location: /opt/Oracle/products/fmw12c/cfgtoollogs/opatch/
opatch2016-09-19_08-09-15AM_1.log

OPatch succeeded.
```

Applying Multiple Patches Using the OPatch napply Command

To apply multiple patches to an Oracle Fusion Middleware Oracle home, use the `opatch napply` command.

Example 1-2 shows how to use the `opatch napply` command to apply multiple patches to an Oracle Fusion Middleware Oracle home.

This example assumes that the patches you have downloaded have been saved to a staging directory, such as:

```
/opt/patches
```

It also assumes that you have changed directory to the staging directory and the staging directory contains a directory for each patch. For example:

```
/opt/patches/15941858
/opt/patches/15955138
```

Example 1-2 Using the OPatch napply Command to Apply Multiple Patches to an Oracle Fusion Middleware Oracle Home

```
> /opt/Oracle/products/fmw12c/OPatch/opatch napply -id 15941858,15955138
Oracle Interim Patch Installer version 13.9.1.0.0
Copyright (c) 2016, Oracle Corporation. All rights reserved.

Oracle Home      : /opt/Oracle/products/fmw12c
Central Inventory : /opt/Oracle/oraInventory
                  from   : /var/opt/Oracle/oraInst.loc
OPatch version   : 13.9.1.0.0
OUI version      : 13.9.1.0.0
Log file location: /opt/Oracle/products/fmw12c/cfgtoollogs/opatch/
opatch2013-06-11_07-36-40AM_1.log

OPatch detects the Middleware Home as "/opt/Oracle/products/fmw12c"

Verifying environment and performing prerequisite checks...
OPatch continues with these patches: 15941858 15955138

Do you want to proceed? [y|n]
y
User Responded with: Y
All checks passed.

Please shutdown Oracle instances running out of this ORACLE_HOME on the local system.
(Oracle Home = '/opt/Oracle/products/fmw12c')

Is the local system ready for patching? [y|n]
y
User Responded with: Y
Backing up files...
Applying interim patch '15941858' to OH '/opt/Oracle/products/fmw12c'
```

```
Patching component oracle.wls.core.app.server,12.2.1.3.0...

Patching component oracle.wls.core.app.server,12.2.1.3.0...
Applying interim patch '15955138' to OH '/opt/Oracle/products/fmw12c'

Patching component oracle.wls.core.app.server,12.2.1.3.0...

Patching component oracle.wls.core.app.server,12.2.1.3.0...
Patches 15941858,15955138 successfully applied.
Log file location: /opt/Oracle/products/fmw12c/cfgtoollogs/opatch/
opatch2013-06-11_07-36-40AM_1.log

OPatch succeeded.
```

Rolling Back a Patch You Have Applied

To roll back a patch that was applied to an Oracle Fusion Middleware Oracle home, use the `opatch rollback` command.

[Example 1-3](#) shows how to use the `opatch rollback` command to roll back a patch that was applied to an Oracle Fusion Middleware Oracle home.

This example assumes that the OPatch directory is already included in the PATH variable on the host computer.

Example 1-3 Using the OPatch rollback Command to Roll Back a Patch

```
> opatch rollback -id 15941858
Oracle Interim Patch Installer version 13.9.1.0.0
Copyright (c) 2016, Oracle Corporation. All rights reserved.

Oracle Home      : /opt/Oracle/products/fmw12c
Central Inventory : /opt/Oracle/oraInventory
   from           : /var/opt/Oracle/oraInst.loc
OPatch version   : 13.9.1.0.0
OUI version      : 13.9.1.0.0
Log file location: /opt/Oracle/products/fmw12c/cfgtoollogs/opatch/
opatch2016-09-19_08-31-35AM_1.log

OPatch detects the Middleware Home as "/opt/Oracle/products/fmw12c"

Patches will be rolled back in the following order:
 15941858
The following patch(es) will be rolled back: 15941858

Please shutdown Oracle instances running out of this ORACLE_HOME on the local system.
(Oracle Home = '/opt/Oracle/products/fmw12c')

Is the local system ready for patching? [y|n]
y
User Responded with: Y

Rolling back patch 15941858...

RollbackSession rolling back interim patch '15941858' from OH '/opt/Oracle/products/
fmw12c'

Patching component oracle.wls.core.app.server, 12.2.1.3.0...

Patching component oracle.wls.core.app.server, 12.2.1.3.0...
```

```
RollbackSession removing interim patch '15941858' from inventory
Log file location: /opt/Oracle/products/fmw12c/cfgtoollogs/opatch/
opatch2016-09-19_08-31-35AM_1.log
```

OPatch succeeded.

Rolling Back Multiple Patches You Have Applied

To roll back multiple patches that were previously applied to an Oracle Fusion Middleware Oracle home, use the `opatch nrollback` command.

[Example 1-4](#) shows how to use the `opatch nrollback` command to roll back multiple patches that were previously applied to an Oracle Fusion Middleware Oracle home.

This example assumes that the patches you applied were patch numbers 15941858 and 15955138.

Example 1-4 Using the OPatch nrollback Command to Roll Back Multiple Patches

```
> /opt/Oracle/products/fmw12c/OPatch/opatch nrollback -id 15941858,15955138
Oracle Interim Patch Installer version 13.9.1.0.0
Copyright (c) 2016, Oracle Corporation. All rights reserved.
```

```
Oracle Home      : /opt/Oracle/products/fmw12c
Central Inventory : /opt/Oracle/oraInventory
  from           : /var/opt/Oracle/oraInst.loc
OPatch version   : 13.9.1.0.0
OUI version      : 13.9.1.0.0
Log file location: /opt/Oracle/products/fmw12c/cfgtoollogs/opatch/
opatch2013-06-10_14-24-54PM_1.log
```

OPatch detects the Middleware Home as "/opt/Oracle/products/fmw12c"

Patches will be rolled back in the following order:

```
15941858 15955138
```

The following patch(es) will be rolled back: 15941858 15955138

Please shutdown Oracle instances running out of this ORACLE_HOME on the local system.
(Oracle Home = '/opt/Oracle/products/fmw12c')

Is the local system ready for patching? [y/n]

Y

User Responded with: Y

Rolling back patch 15941858...

```
RollbackSession rolling back interim patch '15941858' from OH '/opt/Oracle/products/
fmw12c'
```

```
Patching component oracle.wls.core.app.server, 12.2.1.3.0..
```

```
Patching component oracle.wls.core.app.server, 12.2.1.3.0..
```

```
RollbackSession removing interim patch '15941858' from inventory
```

Rolling back patch 15955138...

```
RollbackSession rolling back interim patch '15955138' from OH '/opt/Oracle/products/
fmw12c'
```



```
Patching component oracle.wls.core.app.server, 12.2.1.3.0...

Patching component oracle.wls.core.app.server, 12.2.1.3.0...
RollbackSession removing interim patch '15955138' from inventory
Log file location: /opt/Oracle/products/fmw12c/cfgtoollogs/opatch/
opatch2013-06-10_14-24-54PM_1.log

OPatch succeeded.
```

Troubleshooting a Patch by Viewing the OPatch Log File

To understand how a patch is applied and to troubleshoot any problems with the application of a patch, review the log file for the OPatch session.

The log file location is usually saved to the following directory or a subdirectory within this location:

```
ORACLE_HOME/cfgtoollogs/opatch/
```

Subdirectories within this location are identified by the patch number or by the command you ran (such as `lsinv`).

The file name for each log file identifies the date and time it was executed. For example:

```
opatch2013-06-10_14-24-54PM_1.log
```

You can also locate the log file by viewing the output of the `opatch` command. The log file name and location is included in the output of the command. For example:

```
Log file location: /opt/Oracle/products/fmw12c/cfgtoollogs/opatch/
opatch2013-06-10_14-24-54PM_1.log
```

Using the OPatch `lsinventory` Command to Verify the Patches Applied to an Oracle Home

To verify what patches have been applied to an Oracle home, or to find out additional information about the Oracle home, use the `opatch lsinventory` command.

The following example shows sample output of the `lsinventory` command, which indicates that a specific interim patch has been applied.

Example 1-5 Running the `opatch lsinventory` Command to Obtain the Oracle Home Information

```
> opatch lsinventory
Oracle Interim Patch Installer version 13.9.1.0.0
Copyright (c) 2017, Oracle Corporation. All rights reserved.

Oracle Home      : /opt/Oracle/products/fmw12c
Central Inventory : /opt/Oracle/oraInventory
   from           : /var/opt/Oracle/oraInst.loc
OPatch version   : 13.9.1.0.0
OUI version      : 13.9.1.0.0
Log file location : /opt/Oracle/products/fmw12c/cfgtoollogs/opatch/
opatch2013-06-10_12-32-37PM_1.log
```

```
OPatch detects the Middleware Home as "/opt/Oracle/products/fmw12c"
```

```
Lsinventory Output file location :  
/opt/Oracle/products/fmw12c/cfgtoollogs/opatch/lsinv/  
lsinventory2013-06-10_12-32-37PM.txt
```

```
-----  
-----  
Local Machine Information::
```

```
Hostname:  
ARU platform id: 226  
ARU platform description:: Linux x86-64
```

```
Interim patches (1) :
```

```
Patch 15941858      : applied on Mon Jun 10 12:39:07 PDT 2013  
Unique Patch ID: 150220  
Patch description: "TEST PATCH FOR WLS 12.2.1.3.0 - JAVA CLASSES PATCH"  
Created on 17 May 2013, 11:54:20 hrs PST8PDT  
Bugs fixed:  
783169, 15941850
```

```
-----  
-----  
OPatch succeeded.
```

Verifying the Installation after Applying a Patch

After you apply one or more patches successfully, use the WebLogic Administration Console, Fusion Middleware Control, and your organization's application testing to verify that your system is running successfully.

To verify your installations in an Oracle Fusion Middleware 12c environment:

1. Start the servers in all domains associated with the Oracle home you patched.
2. Open the WebLogic Server Administration Console for each domain to verify the Administration Server and to view the status of the components in the domain.
 - Also, in any Oracle Fusion Middleware domain (where the Oracle Fusion Middleware Infrastructure is installed), open the Oracle Enterprise Manager Fusion Middleware Control console to view the status of the components in the domain.

From either console, you can verify that the servers and applications are up and running correctly. See the following topics in the *Administering Oracle Fusion Middleware* document:

- Starting and Stopping Oracle Fusion Middleware
- Overview of Oracle Fusion Middleware Administration Tools

If the software does not work as expected, follow the rollback instructions in [Rolling Back a Patch You Have Applied](#).

2

Patching Your Environment Using OPatchAuto

OPatchAuto, which is automatically installed with the OPatch utility as a part of your Fusion Middleware installation, provides several commands that you can use to automate the application and roll back of a patch for a single host or multi-host environment.

About Zero Downtime Patching with OPatchAuto

If you patch a multi-host topology, one of the first steps after you download a patch is to identify whether the patch is compatible for Zero Downtime (ZDT) patching.

If it is compatible, you can use one of the following methods to apply the patch with OPatchAuto:

What is a Zero Downtime Patch?

Zero Downtime (ZDT) patching provides a process and mechanism for rolling out a patch across a domain while allowing applications to continue to service requests.

You can apply a ZDT patch by using OPatchAuto, which rolls out the change to one node at a time and allows a load balancer (typically, Oracle Traffic Director (OTD)) to redirect incoming traffic to the remaining nodes until the change is complete.

The recommended way to identify whether a patch is suitable for ZDT patching is to determine the value of the patch uptime option in the metadata of the patch. To identify a ZDT patch, see [Identifying a Zero Downtime Patch](#).

Identifying a Zero Downtime Patch

You can identify a ZDT patch by the value of the patch uptime option in the patch metadata.

After you download a patch, open up `patchdeploy.xml` in the `PATCH_HOME/etc/config` directory, where `PATCH_HOME` is the location of the patch directory that contains the patch.

If the value of `patch-uptime-option` is `FMW_ROLLING_ORACLE_HOME`, as shown in the following example:

```
<patch-uptime-option>FMW_ROLLING_ORACLE_HOME</patch-uptime-option>
```

Or the value is `FMW_ROLLING_SESSION`:

```
<patch-uptime-option>FMW_ROLLING_SESSION</patch-uptime-option>
```

Then, the patch is suitable for ZDT patching.

If `FMW_ROLLING_ORACLE_HOME` or `FMW_ROLLING_SESSION` does not appear in the patch metadata, then you know that the patch is *not* suitable for ZDT patching. As a result, the patch is not compatible with a ZDT patch plan. The value of the patch uptime option helps you to select the appropriate patch plan to apply the patch. For information on selecting a patch plan, see [About the Available Patch Plans](#).

About the Available Patch Plans

After you identify whether a patch is suitable for ZDT patching, identify and select a patch plan. As a result, it is important that you review and understand the characteristics and limitations of the patch plans available for applying a patch.

A patch plan describes the sequence of steps to execute in order to deploy a patch. To execute a plan, you must specify the plan name on the command line using the `-plan` option. See Patch Plans in *Oracle OPatch User's Guide for Windows and UNIX*.

To discover the plans available in an Oracle home, use the `opatchauto lsplans` command. The following example shows a sample output of this command, which lists and describes the available plans:

```
cd ORACLE_HOME/OPatch
./opatchauto lsplans

Oracle OPatchAuto Version 13.9.1.0.0
Copyright (c) 2017, Oracle Corporation. All rights reserved.

OPatchAuto available patch plan information:

Product Name: OPatchAuto Core
Patch Plan Name: rolling (Default)
Description: Process patch targets on a per-home basis and tries to minimize
downtime.
Patch Plan Name: parallel
Description: Process patch targets in parallel and does not attempt to
minimize downtime.

Product Name: Oracle Fusion Middleware
Patch Plan Name: wls-zdt-rollout
Description: Performs full WLS ZDT rollout.
Patch Plan Name: wls-push-image
Description: Performs only image push portion of WLS ZDT rollout.
```

After you identify whether the patch is a ZDT patch (see [Identifying a Zero Downtime Patch](#)), consider the following information when you choose a plan:

- If a patch is not a ZDT patch, use the **parallel** patch plan to apply the patch, as shown in [Applying a non-ZDT Patch on Multiple Hosts Using the Apply Command](#).
- If a patch is a ZDT patch, there are two available plans, `rolling` and `wls-zdt-rollout`.
 - Use the **rolling** option if the patch is a `FMW_ROLLING_ORACLE_HOME` patch. This option uses a pure OPatchAuto approach, where OPatchAuto is used to perform all patching operations. This option is the recommended method for Fusion Middleware.

With this approach, you can perform both image based and non-image based patching. You can also use this approach to perform what is known as configuration patching (or patching operations performed on a domain).

However, this method has no session management features, such as migrating a session to another server when a server is shut down.

For information on how to apply a ZDT patch with the `rolling` plan, see [Applying a ZDT Patch on Multiple Hosts Using the Apply Command](#).

- Use the **wls-zdt-rollout** option if the patch is a `FMW_ROLLING_SESSION` patch. You also use OPatchAuto for this option, but certain lifecycle operations are delegated to WebLogic Server components, such as WLST or the WebLogic Server Administration Console. This option is recommended for WebLogic Server only.

This approach only supports image based patching and does not support configuration patching. But, it supports migrating a session when an instance is shut down.

This document does not cover the steps to apply a ZDT patch using this option. See Introduction to Zero Downtime Patching in *Administering Zero Downtime Patching Workflows* to learn more about this option.

Preparing to Use OPatchAuto

To ensure successful patching, complete the prerequisites to prepare your environment to run OPatchAuto, such as obtaining the latest version of OPatch, obtaining required patches from My Oracle Support, and backing up the environment.

Locating and Obtaining the Latest Version of OPatch and OPatchAuto

Before you run OPatchAuto, find the OPatchAuto utility in the Oracle home and verify that you have the latest version. If you have the latest version of OPatchAuto, you have the latest version of OPatch.

Locating and Running OPatchAuto in the Oracle Fusion Middleware Oracle Home

You can find and run the OPatchAuto utility in the `ORACLE_HOME/OPatch` directory after you install any Oracle Fusion Middleware product.

To run OPatchAuto, run the `opatchauto` command in this directory.

For example, to view the list of commands available for OPatchAuto on a Unix system, enter the following:

```
./opatchauto -help
```

Identifying the Version of OPatchAuto Included with Oracle Fusion Middleware 12c

Oracle Fusion Middleware 12c (12.2.1.3.0) includes OPatchAuto version 13.9.1.0.0. Use the `opatchauto version` command to verify that you have this version.

In general, there is a version of OPatch and OPatchAuto available for each version of the Oracle Universal Installer software.

To identify the version of OPatchAuto:

1. Change to the following directory:

```
cd ORACLE_HOME/OPatch/
```

2. Run the following command:

```
./opatchauto version
```

For example:

```
./opatchauto version
Oracle OPatchAuto Version 13.9.1.0.0
Copyright (c) 2017, Oracle Corporation. All rights reserved.
```

```
1. OPatchAuto version 13.9.1.0.0
```

If you have the latest version of OPatchAuto, you have the latest version of OPatch. If you do not have the latest version, OPatch can be downloaded by using the patch [6880880](#). Always use the latest download designated for your installation. For Oracle Fusion Middleware 12c (12.2.1.3.0), select **OUI NextGen 13.9.1** for the version and platform, and then click **Download** to download OUI NextGen OPatch 13.9.1.

Obtaining Patches Required For Your Installation

You can search for and download the latest patches for your installation from My Oracle Support.

You can check for the latest patches available for your Oracle Fusion Middleware product or component by registering and logging in to My Oracle Support at:

<http://support.oracle.com>

After you sign in to My Oracle Support, click the **Patches & Updates** tab. This tab provides various tools that allow you to locate the patches most important to your Oracle software installation.



Note:

It is important that you review the README file that is included with each patch. The README file includes important information about the requirements and procedures to apply the patch.

Directory Variables Used in the Examples

The examples in this guide show sample commands to run OPatchAuto. These example commands use variables to reference key directories.

The following directory variables are used in this guide:

- *ORACLE_HOME*, which is used to reference the location of the Oracle home directory.
- *PATCH_HOME*, which is used to reference the location of the patch directory that contains the patches to be applied to the Oracle home.
- *DOMAIN_HOME*, which is used to reference the location of the domain home directory.

Creating a Topology File for Patching Multiple Hosts

To apply a patch on multiple hosts, you must create a topology file that defines the elements of your topology. To create a topology file, use FMW (Fusion Middleware) Composer, which is located in `ORACLE_HOME/oracle_common/bin`. Composer provides a graphical user interface that describes the Fusion Middleware topology.

Use Composer to add and define each element of the topology individually. After you create your topology in Composer, you can save it to an XML or JSON file. You can then provide this file to OPatchAuto to apply the patch.

Creating a Wallet

To run OPatchAuto successfully, you must provide a wallet on the command line that contains the necessary password credentials, such as the SSH credentials for each host.

To create a wallet, you can use one of the following tools:

Creating a Wallet Using the `patchingWallet` Tool

You can use the `patchingWallet.sh` tool in the `ORACLE_HOME/OPatch/auto/core/bin` directory to create a wallet file.

When you create a wallet:

- Define the SSH credentials for each host by using the format `"user:hostname:ssh"`
- Define the WebLogic administrator credentials by using the format `"adminuser:adminhost:wls"`. The `wls` credential is required if you are using the `wls-zdt-rollout` option to apply a ZDT patch.

The following shows an example of how to create a wallet and add the credentials to the wallet:

```
./patchingWallet.sh -walletDir wallet_location -create "user:adminhost:ssh"  
"user:host1:ssh" "user:host2:ssh"  
"adminuser:domain_name/ADMIN" "adminuser:domain_name/NM"
```

For example:

```
./patchingWallet.sh -walletDir /tmp/samplewallet -create "oracle:adminhost:ssh"  
"oracle:host1:ssh"  
"oracle:host2:ssh" "weblogic:zdtDomain/ADMIN" "weblogic:zdtDomain/NM"
```

The tool prompts you to enter and confirm the password for each credential:

```
Enter Password for oracle:adminhost:ssh:  
Confirm Password for oracle:adminhost:ssh:  
Enter Password for oracle:host1:ssh:  
Confirm Password for oracle:host1:ssh:  
Enter Password for oracle:host2:ssh:  
Confirm Password for oracle:host2:ssh:  
Enter Password for weblogic:zdtDomain/ADMIN:  
Confirm Password for weblogic:zdtDomain/ADMIN:  
Enter Password for weblogic:zdtDomain/NM:  
Confirm Password for weblogic:zdtDomain/NM:
```

Configuring Node Manager to Support Start and Stop Operations

To ensure that OPatchAuto can properly stop and start your system during patching, you must configure the Node Manager to support the start and stop operations.

To do this, set the `QuitEnabled` and `CrashRecoveryEnabled` properties in the `nodemanager.properties` file as follows:

```
QuitEnabled=true  
CrashRecoveryEnabled=false
```

The default value for `CrashRecoveryEnabled` is `false`.

By default, this file is created in the Node Manager home directory, where the Node Manager home is typically `DOMAIN_HOME/nodemanager`.

Note:

For ZDT patching:

- `QuitEnabled=true` is only required if you use the rolling plan to apply a ZDT patch. This is not required if you use the `wls-zdt-rollout` plan, which is described in *Introduction to Zero Downtime Patching in Administering Zero Downtime Patching Workflows*.
- If you use the `wls-zdt-rollout` plan, then set `CrashRecoveryEnabled` to `true`.

After you update these properties, restart one or more Node Managers.

For more information about the `nodemanager.properties` file, see *Reviewing nodemanager.properties in Administering Node Manager for Oracle WebLogic Server*.

Remote Host Patching on Windows

For patching on Windows systems, ensure that Cygwin SSH server is installed and set up. OPatchAuto does not support other SSH servers currently.

See *Remote Host Execution Using SSH in the Oracle OPatch User's Guide for Windows and UNIX*.

Backup and Recovery Considerations for Patching

It is highly recommended that you back up the Oracle home before any patch operation. You can back up the Oracle home by using your preferred method.

You can use any method such as `zip`, `cp -r`, `tar`, and `cpio` to compress the Oracle home.

If the Oracle home does not appear when you execute the `opatch lsinventory -detail` command, the Oracle home might be missing from the Central Inventory, or the Central Inventory itself could be missing or corrupted.

If the Oracle home is listed when you execute the `opatch lsinventory -detail` command, but the products and components within the Oracle home are not listed, the inventory within the Oracle home (local inventory) might be missing or corrupted.

If the local inventory is corrupted or lost for some reason, you must restore the entire Oracle home if it was backed up. If a backup does not exist, you may have to reinstall the software.

Using OPatchAuto to Patch Oracle Fusion Middleware

You can use OPatchAuto to automate the necessary steps for applying or rolling back a patch on a single host or multi-host environment.

The following topics describe how to use OPatchAuto to patch Oracle Fusion Middleware.

Summary of the Steps For Using OPatchAuto in a Fusion Middleware Environment

Applying a patch with OPatchAuto involves a series of steps that must be performed to ensure successful patching.

The following table summarizes the typical steps required to patch your existing Fusion Middleware environment using OPatchAuto.

Table 2-1 Using OPatchAuto with Oracle Fusion Middleware

Task	Description	Documentation
Acquire patches required for your installation.	Log in, search for, and download the patches required for your specific installation. You do not need to worry about checking whether OPatchAuto supports a particular patch type. If OPatchAuto does not support a particular patch type, you are notified when you run the tool.	Obtaining Patches Required For Your Installation
Review the <code>README.txt</code> file for the patch.	Each patch archive includes a <code>README</code> file that contains important information and instructions that must be followed prior to applying your patch. It is important to review the <code>README</code> file because it provides any unique steps or other information specific to the patch.	The <code>README.txt</code> file that is packaged within the patch archive
For a multi-host environment, identify whether the patch is a ZDT patch.	To identify whether the patch is a ZDT patch, determine the patch uptime option in <code>patchdeploy.xml</code> . Once you know the value of the patch uptime option, you can identify the patch plan to use to apply the patch.	Identifying a Zero Downtime Patch About the Available Patch Plans

Table 2-1 (Cont.) Using OPatchAuto with Oracle Fusion Middleware

Task	Description	Documentation
Check for patch prerequisites.	The OPatchAuto <code>apply -analyze</code> command will identify that the prerequisites for the patch have been met.	If you are patching a single host environment, see Verifying the Prerequisites for Applying a Patch on a Single Host . If you are patching a multi-host environment, see Verifying the Prerequisites for Applying a Patch on Multiple Hosts .
Apply the patch.	After you determine the Oracle home to which you need to apply the patch and have read the README file, you can use the <code>opatchauto apply</code> command to apply the patch.	If you are patching a single-host environment, see Applying a Patch on a Single Host Using the Apply Command . If you are patching a multi-host environment, see one of the following, depending on whether the patch is suitable for ZDT patching: <ul style="list-style-type: none"> • Applying a non-ZDT Patch on Multiple Hosts Using the Apply Command • Applying a ZDT Patch on Multiple Hosts Using the Apply Command
Verify that the patch was applied to the Oracle home successfully.	The <code>OPatch lsinventory</code> command shows the patches that have been applied to the Oracle home. The <code>listDomainPatchInventory.sh</code> command shows the patches applied to the domain. Use these commands together to verify the application of the patch.	Using the OPatch lsinventory Command to Verify the Patches Applied to an Oracle Home Using the listDomainPatchInventory.sh Command to Verify the Patches Applied to a Domain
Verify that your software runs properly after you apply the patch.	After patching is complete and your servers are restarted, check your product software to verify that the issue has been resolved.	Verifying the Installation after Applying a Patch
Troubleshoot the application of a patch.	If there are problems applying a patch, your first troubleshooting task is to review the log file for the OPatchAuto session.	Troubleshooting a Patch by Viewing the OPatchAuto Log File
Roll back the application of a patch.	If for some reason the result is not satisfactory, you can use the <code>opatchauto rollback</code> command to remove the patch from the Oracle home. If more assistance is required, go to My Oracle Support (formerly OracleMetaLink).	For a single host environment, see Rolling Back a Patch You Have Applied on a Single Host . For a multi-host environment, see Rolling Back a Patch You Have Applied on Multiple Hosts .

Applying a Patch on a Single Host Using OPatchAuto

After you obtain the patches required for your installation, use the `opatchauto apply -analyze` command to verify prerequisites, and then use `opatchauto apply` to apply a patch on a single host. If needed, you can use `opatchauto rollback` to roll back a patch.

Patching a single host environment with OPatchAuto involves the following tasks:

Verifying the Prerequisites for Applying a Patch on a Single Host

To verify that a patch can be applied on a single host, use the `-analyze` argument to the `OPatchAuto apply` command. For single host patching, you must also provide the domain location using the `-instance` argument.

The following command shows how to verify the prerequisites for applying a patch on a single host:

```
opatchauto apply PATCH_HOME -analyze -instance DOMAIN_HOME -wallet wallet_location -  
walletPassword password_ifneeded  
-wls-admin-host weblogic_adminserver_host:port
```

For example:

```
opatchauto apply /home/oracle/patches/15941858 -analyze -instance /home/oracle/  
config/domains/exampledomain -wallet /tmp/samplewallet  
-wls-admin-host examplehost.exampledomain.com:7001
```

If you want to apply multiple patches in one session, use the `-phBaseDir` option.

This command analyzes and displays the actions that are taken by the patch, but does not actually apply the patch. As a result, it allows you to verify that the prerequisites for the patch have been met.

If any prerequisite checks fail, refer to the output and log file to fix the issues before you continue. For example, a common failure is the detection of patch conflicts. If any patch conflicts occur, follow the instructions in the log file for how to obtain a merge patch from Oracle Support.

Applying a Patch on a Single Host Using the Apply Command

To apply a patch on a single host, use the `opatchauto apply` command. This is the same command as `opatchauto apply -analyze`, except you remove the `-analyze` argument when you are ready to apply the patch.

The following example shows how to use the `opatchauto apply` command to apply a patch to an Oracle Fusion Middleware environment on a single host.

This example assumes that:

- The patch you have downloaded has been saved to a directory that is named for the patch number in My Oracle Support. In this case, the patch number is 15941858.
- Run the `OPatchAuto` command from the `ORACLE_HOME/OPatch` directory and include the location of the patch (`PATCH_HOME`) as an argument to the command.

Note:

When you run the `opatchauto apply` command, make a note of the session id (for example, EKZR) in the command output. This simplifies the rollback process if you decide to roll back the patch later.

```
opatchauto apply PATCH_HOME -instance DOMAIN_HOME -wallet wallet_location -  
walletPassword password_ifneeded -wls-admin-host weblogic_adminserver_host:port
```

For example:

```
opatchauto apply /home/oracle/patches/15941858 -instance /home/oracle/config/domains/  
exampledomain -wallet /tmp/samplewallet  
-walletPassword password -wls-admin-host examplehost.exampledomain.com:7001
```

Rolling Back a Patch You Have Applied on a Single Host

If you apply a patch and the results are not satisfactory, use the `opatchauto rollback` command to roll back the application of the patch. This is the same command as `opatchauto rollback -analyze`, except you remove the `-analyze` argument when you are ready to roll back the patch.

The following example shows how to use the `opatchauto rollback` command to roll back a patch that was applied to an Oracle Fusion Middleware environment on a single host.

To do a rollback, you follow the same process that you used to apply the patch. That is, you first do a test run of the `opatchauto rollback` command:



Note:

You can simplify the command if you provide the session id (for example, EKZR) that was used to apply the patch. Then, OPatchAuto can derive all the necessary command-line parameters.

```
opatchauto rollback -session session_id -analyze -wallet wallet_location -  
walletPassword password_ifneeded -wls-admin-host weblogic_adminserver_host:port
```

For example:

```
opatchauto rollback -session EKZR -analyze -wallet /tmp/samplewallet -walletPassword  
password -wls-admin-host examplehost.exampledomain.com:7001
```

When the test run successfully passes, perform the actual rollback of the patch:

```
opatchauto rollback -session session_id -wallet wallet_location -walletPassword  
password_ifneeded -wls-admin-host weblogic_adminserver_host:port
```

For example:

```
opatchauto rollback -session EKZR -wallet /tmp/samplewallet -walletPassword password  
-wls-admin-host examplehost.exampledomain.com:7001
```

Alternatively, you can roll back the patch by pointing OPatchAuto to a copy of the unzipped patch as follows:

```
opatchauto rollback unzipped_patch_location -instance DOMAIN_HOME -wallet  
wallet_location -walletPassword password_ifneeded  
-wls-admin-host weblogic_adminserver_host:port
```

Applying a Patch on Multiple Hosts Using OPatchAuto

After you obtain the necessary patches, use the `opatchauto apply -analyze` command to verify prerequisites, and then use `opatchauto apply` to apply a patch on multiple hosts. If needed, you can use `opatchauto rollback` to roll back a patch.

Note:

Before you apply a patch on multiple hosts, ensure that you have created a topology file by using FMW Composer. You must supply this file, which can be either an XML or JSON file, on the command line using the `-topology` option when you run OPatchAuto. OPatchAuto uses this file to obtain information about the environment that you want to patch.

Patching a multi-host environment with OPatchAuto involves the following tasks:

Verifying the Prerequisites for Applying a Patch on Multiple Hosts

To ensure successful patching, use the `opatchauto apply -analyze` command to check for any prerequisites before you apply a patch.

To verify that a patch can be applied to a specific Oracle home (ORACLE_HOME) and domain location (DOMAIN_HOME) on multiple hosts, use the `-analyze` argument to the OPatchAuto `apply` command.

```
opatchauto apply PATCH_HOME -analyze -plan patch_plan -topology  
path_to_topology_file -wallet wallet_location -walletPassword password_ifneeded
```

For example:

```
opatchauto apply /home/oracle/patches/15941858 -analyze -plan rolling -topology /  
home/oracle/topologies/topology-1.0.xml -wallet /tmp/samplewallet -walletPassword  
password
```

If you want to apply multiple patches in one session, use the `-phBaseDir` option.

Note that `rolling` is the default patch plan if no plan is specified on the command line. For information on identifying the available plans, see [About the Available Patch Plans](#).

This command displays the actions that are taken by the patch, but does not actually apply the patch. As a result, it allows you to verify that the prerequisites for the patch have been met.

If any prerequisite checks fail, refer to the command output and log file to fix any issues before you continue. For example, a common failure is the detection of patch conflicts. If any patch conflicts occur, follow the instructions in the log file for how to obtain a merge patch from Oracle Support.

Applying a non-ZDT Patch on Multiple Hosts Using the Apply Command

To apply a non-ZDT patch, use the `opatchauto apply` command with the `parallel` patch plan. This command is the same command as `opatchauto apply -analyze`, except you remove the `-analyze` argument when you are ready to apply the patch.

The following example shows how to use the `opatchauto apply` command to apply a non-ZDT patch to an Oracle Fusion Middleware environment on multiple hosts.

This example assumes that:

- The patch you have downloaded has been saved to a directory that is named for the patch number in My Oracle Support. In this case, the patch number is 15941858.
- Run the OPatchAuto command from the `ORACLE_HOME/OPatch` directory and include the location of the patch (`PATCH_HOME`) as an argument to the command.

Note:

When you run the `opatchauto apply` command, make a note of the session id (for example, EKZR) in the command output. The session id simplifies the rollback process if you decide to roll back the patch later.

```
opatchauto apply PATCH_HOME -plan parallel -topology path_to_topology_file -wallet  
wallet_location -walletPassword password_ifneeded
```

For example:

```
opatchauto apply /home/oracle/patches/15941858 -plan parallel -topology /home/oracle/  
topologies/topology-1.0.xml -wallet /tmp/samplewallet -walletPassword password
```

Applying a ZDT Patch on Multiple Hosts Using the Apply Command

To apply a Zero Downtime (ZDT) patch, use the `opatchauto apply` command with the `rolling` patch plan. This command is the same command as `opatchauto apply -analyze`, except you remove the `-analyze` argument when you are ready to apply the patch.

The following example shows how to use the `opatchauto apply` command to apply a ZDT patch to an Oracle Fusion Middleware environment on multiple hosts.

This example assumes that:

- The patch you have downloaded has been saved to a directory that is named for the patch number in My Oracle Support. In this case, the patch number is 15941858.
- Run the OPatchAuto command from the `ORACLE_HOME/OPatch` directory and include the location of the patch (`PATCH_HOME`) as an argument to the command.

 **Note:**

- When you run the `opatchauto apply` command, make a note of the session id (for example, EKZR) in the command output. The session id simplifies the rollback process if you decide to roll back the patch later.
- `rolling` is the default patch plan if no plan is specified on the command line.

```
opatchauto apply PATCH_HOME -plan rolling -topology path_to_topology_file -wallet  
wallet_location -walletPassword password_ifneeded
```

For example:

```
opatchauto apply /home/oracle/patches/15941858 -plan rolling -topology /home/oracle/  
topologies/topology-1.0.xml -wallet /tmp/samplewallet -walletPassword password
```

Rolling Back a Patch You Have Applied on Multiple Hosts

If you apply a patch and the results are not satisfactory, use the `opatchauto rollback` command to roll back the application of a patch. This is the same command as `opatchauto rollback -analyze`, except you remove the `-analyze` argument when you are ready to roll back the patch.

The following example shows how to use the `opatchauto rollback` command to roll back a patch that was applied to an Oracle Fusion Middleware environment on multiple hosts.

To do a rollback, you follow the same process that you used to apply the patch. That is, you first do a test run of the `opatchauto rollback` command:

 **Note:**

You can simplify the command if you provide the session id (for example, EKZR) that was used to apply the patch. Then, OPatchAuto can derive all the necessary command-line parameters.

```
opatchauto rollback -session session_id -analyze -walletPassword password_ifneeded
```

For example:

```
opatchauto rollback -session EKZR -analyze -walletPassword password
```

When the test run successfully passes, perform the actual rollback of the patch:

```
opatchauto rollback -session session_id -walletPassword password_ifneeded
```

For example:

```
opatchauto rollback -session EKZR -walletPassword password
```

Alternatively, you can roll back the patch by pointing OPatchAuto to a copy of the unzipped patch as follows:

```
opatchauto rollback unzipped_patch_location -topology path_to_topology_file -wallet  
wallet_location -walletPassword password_ifneeded
```

Or, you can specify the patch id using the `-id` option without specifying the location of the patch directory, as shown in the following example:

```
opatchauto rollback -id 12345 -wallet /tmp/samplewallet -topology /home/oracle/  
topologies/topology-1.0.json
```

Setting SSL Arguments (SSL only Environment)

In a SSL only environment, complete the following steps for patching using `opatchauto`:

1. Provide the administration server details with the protocol information. For example: `-wls-admin-host t3s://<HOST_NAME>`.
2. If required, set additional system properties while invoking `opatchauto`. For example: `-Dweblogic.security.TrustKeyStore=DemoTrust`.

For additional information related to properties, see [WebLogic Server Command Reference](#).

Troubleshooting a Patch by Viewing the OPatchAuto Log File

To understand how a patch is applied and to troubleshoot any problems with the application of a patch, review the log file for the OPatchAuto session.

The log file location is usually saved to the following directory or a subdirectory within this location:

```
ORACLE_HOME/cfgtoollogs/opatchauto/
```

The file name for each log file identifies the date and time it was executed. For example:

```
opatchauto2015-09-28_11-47-13AM.log
```

You can also locate the log file by viewing the output of the `opatchauto` command. The log file name and location is included in the output of the command. For example:

```
Session log file is /home/Oracle/products/fmw12c/cfgtoollogs/opatchauto/  
opatchauto2015-09-28_11-47-13AM.log
```

Using the OPatch lsinventory Command to Verify the Patches Applied to an Oracle Home

To verify what patches have been applied to an Oracle home, or to find out additional information about the Oracle home, use the `opatch lsinventory` command.

The following example shows sample output of the `lsinventory` command, which indicates that a specific interim patch has been applied.

Example 2-1 Running the opatch lsinventory Command to Obtain the Oracle Home Information

```
> opatch lsinventory
Oracle Interim Patch Installer version 13.9.1.0.0
Copyright (c) 2017, Oracle Corporation. All rights reserved.

Oracle Home      : /opt/Oracle/products/fmw12c
Central Inventory : /opt/Oracle/oraInventory
   from          : /var/opt/Oracle/oraInst.loc
OPatch version   : 13.9.1.0.0
OUI version      : 13.9.1.0.0
Log file location : /opt/Oracle/products/fmw12c/cfgtoollogs/opatch/
opatch2013-06-10_12-32-37PM_1.log

OPatch detects the Middleware Home as "/opt/Oracle/products/fmw12c"

Lsinventory Output file location :
/opt/Oracle/products/fmw12c/cfgtoollogs/opatch/lsinv/
lsinventory2013-06-10_12-32-37PM.txt

-----
-----
Local Machine Information::
Hostname:
ARU platform id: 226
ARU platform description:: Linux x86-64

Interim patches (1) :

Patch 15941858      : applied on Mon Jun 10 12:39:07 PDT 2013
Unique Patch ID: 150220
Patch description: "TEST PATCH FOR WLS 12.2.1.3.0 - JAVA CLASSES PATCH"
   Created on 17 May 2013, 11:54:20 hrs PST8PDT
   Bugs fixed:
       783169, 15941850

-----
-----

OPatch succeeded.
```

Using the listDomainPatchInventory.sh Command to Verify the Patches Applied to a Domain

To verify the patches that have been applied to a domain, use the `listDomainPatchInventory.sh` command. Use this command with the `OPatch lsinventory` command to verify that the patch has been applied successfully.

For example:

```
cd ORACLE_HOME/OPatch/bin
./listDomainPatchInventory.sh DOMAIN_HOME
```

This command indicates that a specific interim patch has been applied.

If you do not see same list of patches in both the domain inventory and in the inventory for each Oracle home, reapply the patch. When you reapply the patch, only the missing steps are executed. The tasks that have already been performed are skipped.

Verifying the Installation after Applying a Patch

After you apply one or more patches, use the WebLogic Administration Console, Fusion Middleware Control, and your organization's application testing to verify that your system is running successfully.

To verify your installations in an Oracle Fusion Middleware 12c environment:

1. Ensure that all the servers in all the domains associated with the Oracle home you patched are up and running.

 **Note:**

If the servers were up and running before patching, it is not necessary to manually restart the servers. OPatchAuto restarts the servers for you once patching is complete.

2. Open the WebLogic Server Administration Console for each domain to verify the Administration Server and to view the status of the components in the domain.

Also, in any Oracle Fusion Middleware domain (where the Oracle Fusion Middleware Infrastructure is installed), open the Oracle Enterprise Manager Fusion Middleware Control console to view the status of the components in the domain.

From either console, you can verify that the servers and applications are up and running correctly. For more information, see the following topics in *Administering Oracle Fusion Middleware*:

- Starting and Stopping Oracle Fusion Middleware
- Overview of Oracle Fusion Middleware Administration Tools

If the software does not work as expected, follow the rollback instructions to roll back the application of the patch.