Oracle Utilities Network Management System

Installation Guide

Release 1.12.0.1.0

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Oracle Utilities Network Management System Installation Guide, Release 1.12.0.1.0

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Contents

Preface

The information in this document is intended to guide you through a successful Oracle Utilities Network Management System installation or upgrade.

Audience

This document is intended for administrators and engineers responsible for installing and upgrading Oracle Utilities Network Management System.

Related Documents

For more information, see the following documents in the Oracle Utilities Network Management System Release 1.12.0 documentation set:

- *Oracle Utilities Network Management System Quick Install Guide*
- *Oracle Utilities Network Management System User's Guide*
- *Oracle Utilities Network Management System Configuration Guide*
- *Oracle Utilities Network Management System Adapters Guide*
- *Oracle Utilities Network Management System Product Fix Documents (service packs and patch bundles only)*

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.
italic	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.

Chapter 1

Introduction

The information in the *Oracle Utilities Network Management System Installation Guide* is intended to take you through a successful Oracle Utilities Network Management System installation or upgrade.

- **Chapter 2** - **Pre-Installation** describes the prerequisite steps to ensure that your environment is ready to install the Oracle Utilities Network Management System. It is important that you understand and complete these prerequisite steps before you begin the Oracle Utilities Network Management System installation.
- **Chapter 3** - **System Installation** provides step-by-step installation and setup instructions for the **Oracle Utilities Network Management System**.
- **Appendix A** - **Updating Configuration and Performing Migrations for a New Release** provides information for comparing and merging your configuration files with a new Oracle Utilities Network Management System release.
- **Appendix B** - **Third Party Software** provides licensing and copyright information associated with the open source third party products installed with Oracle Utilities Network Management System.

Further information on configuring your system can be found in the *Oracle Utilities Network Management System Configuration Guide*. Note, however, that you must complete the tasks described in this guide, in the required order, before proceeding to any post-installation tasks.

Product Release Naming Conventions

Oracle Utilities Network Management System product releases occur as General Availability (GA) Releases, Service Packs, and Patch Bundles.

- **GA Releases** (*e.g.*, 1.**10**.0, 1.**11**.0, 1.**12**.0, …) are complete (new) binary releases with full documentation sets and Quality Assurance (QA) processes.
- **Service Packs** (*e.g.*, 1.12.0.**1**, 1.12.0.**2**, 1.12.0.**3**, …) are complete (new) binary releases containing a limited set of new features and all bug fixes since the last GA or Service Pack release. Service Packs include targeted QA testing, which is based on current customer platforms and module usage.
- **Patch Bundles** (*e.g.*, 1.12.0.0.**1**, 1.12.0.0.**2**, 1.12.0.0.**3**, …) - These contain only bug fixes and changed files since the last GA release or service pack. This release will go through QA bug regression testing to verify the system will start and perform basic functionality. Patch bundles are cumulative and the latest patch bundle will always contain **all** patches for that service pack.

System Overview

The Oracle Utilities Network Management System can be broken down into individual components. Each component is installed and configured separately. Oracle Utilities Network Management System uses a client/server architecture. The server supports Oracle Utilities Network Management System daemon processes, while the clients display a graphical user interface to allow the user to interact with the system. Internal daemon service process to daemon service process communication is managed with a concurrency management and messaging system called Isis. Isis is the backbone of the communication architecture for an Oracle Utilities Network Management System. The network model, system configuration, and operational data is all stored persistently in an Oracle database.

The table below describes the Oracle Utilities Network Management System components.

Component	Description
Client User Environments	The Java-based end-user environments are configured using a combination of SQL files (RDBMS table based configuration), XML files, and Java properties files. The XML files are based on an NMS-specific XML schema, which provides the foundation for Java user interface customization.
Isis	Clients access services and tools through a central concurrency management and messaging system called Isis. Isis is a real-time implementation of message oriented middleware that helps provide access to the Oracle Utilities Network Management System daemon service processes as well as inter-daemon process communication.
Services	Services maintain and manage the real-time electrical network data model. Services also cache information from the database tables to optimize client information access.
Oracle WebLogic	Oracle WebLogic hosts Oracle Utilities Network Management System specific Enterprise Java Beans (EJBs). These EJBs help cache the network model and process updates/requests to/from Java clients as well as to/from external systems.
Web-Gateway	The Web-Gateway is a CORBA (Common Object Request Broker Architecture) interface between Network Management System daemon processes and WebLogic EJBs.
Oracle Database	The Oracle Database contains the complete network data model, configuration, and operational data history of an Oracle Utilities Network Management System.

Note: Services, applications, and the Oracle RDBMS tablespaces can be spread over multiple servers or run on a single server. The simplest configuration is for everything (Oracle RDBMS, Oracle Utilities Network Management System services and Oracle WebLogic Java Application Server to run on a single (generally SMP) server. Common variations would include the use of a cluster based hardware server to support high-availability (for Oracle RDBMS and Oracle Utilities Network Management System Services). This provides flexibility for system configuration, depending on your needs and hardware.

Chapter 2

Pre-Installation

This chapter provides an overview of the installation requirements for Oracle Utilities Network Management System and provides additional information that you should read before you begin the installation process. This chapter includes the following topics:

- **Prerequisites for Installation of Oracle Utilities Network Management System**
- **Operating System and Administrative User Setup**

Prerequisites for Installation of Oracle Utilities Network Management System

This section includes the following topics:

- **Introduction**
- **Requirements for Oracle Utilities Network Management System Database**
- **Requirements for Spatial Landbase**
- **Requirements for Java Application Server**
- **Software Requirements for Unzipping Files**
- **Security Considerations**
- **Isis Directory and NTP Daemon**
- **STLport Libraries for Solaris**
- **Client Authentication**

Introduction

In order to successfully install the Oracle Utilities Network Management System (and underlying environment), you must have a thorough understanding of the following:

- Unix system administration
- Oracle RDBMS installation and configuration
- WebLogic installation and EJB deployment

In addition, you should have at least a cursory knowledge of the Oracle Utilities Network Management System architecture and applications functionality.

The *Oracle Utilities Network Management System Quick Install Guide* provides an overview of the Oracle Utilities Network Management System architecture and lists the supported hardware and software configurations. Verify that your system meets system requirements prior to attempting the Oracle Utilities Network Management System installation.

Requirements for Oracle Utilities Network Management System Database

The Oracle RDBMS must be installed and configured before beginning the Oracle Utilities Network Management System. It must be installed on a server that is accessible from the Oracle Utilities Network Management System services applications. Time zone settings for the Oracle RDBMS and Oracle Utilities Network Management System services application must be the same.

Refer to the "Database Configuration" chapter of the *Oracle Utilities Network Management System Configuration Guide* for more details regarding the installation and configuration of the Oracle RDBMS for use with the Oracle Utilities Network Management System applications.

> **Note:** Oracle Locator, a standard component of all editions of Oracle RDBMS, is **required** for the Oracle Utilities Network Management System installation.
>
> To verify that Oracle Locator has not been removed from your Oracle RDBMS, run the following SQL command:
>
> ```
> select count(1) "Rows" from mdsys.cs_srs;
> ```
>
> If this query returns zero or very few rows (1000+ are expected), consult your DBA to (re)install the Oracle Locator package.

Requirements for Spatial Landbase

The Oracle Utilities Network Management System recommend installation of the Oracle Map Builder to simplify the process of creating and managing map, theme, and symbology metadata in the spatial database used to render spatial landbase maps. Oracle Map Builder is part of the Oracle Fusion Middleware MapViewer family of products, which is available for download from the Oracle Technology Network website (www.oracle.com/technetwork/).

Requirements for Web Maps Landbase

The Oracle Utilities Network Management System supports use of commercial web map servers for viewer background landbases. It is up to each NMS customer to license with a web map provider for access to a web map service. To configure these into the NMS installation, the map provider will typically supply two required items:

1. an access key to track your license and map data usage;
2. a web address or URL to access the map server.

Requirements for Java Application Server

The Oracle Utilities Network Management System requires the installation of a WebLogic Application Server. This installation should be done before installing the Oracle Utilities Network Management System software. Refer to *Oracle Fusion Middleware Installation Guide for Oracle WebLogic Server* for instructions.

Software Requirements for Unzipping Files

The Oracle Utilities Network Management System and third party software files are compressed in the ZIP format. Most Linux/Unix-based platforms already have the binaries needed to unzip the distribution archives. An unzip utility is also included in the Oracle client under `$ORACLE_HOME/bin`.

Security Considerations

Please refer to the "Security Guide" chapter of the *Oracle Utilities Network Management System Configuration Guide* for security overview, recommendations, and guidelines when installing Oracle Utilities Network Management System software.

OpenSSL

Oracle Utilities Network Management System now uses OpenSSL to encrypt traffic between SwService (used in CVR and FLISR) and WebLogic server by default. As such, OpenSSL is now required to be installed with the operating system if you will be running SwService. The openssl binary as well as libssl and libcrypto are required.

To make them available, you will need to install the appropriate OS packages on your system:

- **Linux:** openssl and openssl-devel RPM's
- **AIX**: openssl.base fileset
- **Solaris:** library/security/openssl package

Isis Directory and NTP Daemon

Isis is the backbone of the Oracle Utilities Network Management System. It is the messaging bus through which all back-end NMS service components communicate.

On any computer using Isis it is important to have an accurate clock, which moves monotonically forward. Many approaches, such as rdate, can cause the clock to jump unpredictably, possibly backwards. This jumping is especially deleterious to Isis timing and timer queues, but can easily be avoided by using the Network Time Protocol (NTP) daemon, which is designed to gracefully synchronize the system clock with any reliable time source.

NTP is available for free on all operating systems and is simple to configure. Even if all of your services and applications run on a single computer, it is important to run NTP there. If you have several computers on the same LAN, you may want to consider running an NTP server (pointing to an external time source) on one of them and pointing all of the other NTP clients on the LAN to it.

Refer to the "Isis Configuration" chapter of the *Oracle Utilities Network Management System Configuration Guide* for more details regarding the configuration of the Isis message bus for use with the Oracle Utilities Network Management System applications.

STLport Libraries for Solaris

The C++ Standard Template Library that ships with Solaris does not comply with the ISO C++ standard (in order to maintain backward compatibility for older applications) and is not adequate for running Oracle Utilities Network Management System software. Therefore, for Solaris systems, before starting the Oracle Utilities Network Management System services, you will need to download and install a copy of STLport libraries.

Solaris Studio 12.3 contains the certified, ISO C++ compliant version of the Standard Template Library. It can be downloaded from:

http://www.oracle.com/technetwork/server-storage/solarisstudio/downloads/index.html

You will also need to configure the path to the Solaris Studio installation (by default, `/opt/solarisstudio12.3`) when you run `config_nmsrc.pl` during the Oracle Utilities Network Management System installation.

Client Authentication

Beginning with Oracle Utilities Network Management System 1.11.0.0, client authentication has changed in that passwords are no longer stored in the database. Authorization and roles are still stored in the database, but the authentication must come from an external source. No matter what the authentication source, each login name must be granted access to the system by using the Configuration Assistant. Active Directory and LDAP are supported authentication sources.

Operating System and Administrative User Setup

In order to install Oracle Utilities Network Management System software, you must have your system administrator configure a Linux/Unix environment and setup the environment for the Oracle Utilities Network Management System administrative user.

- **Administrative User Configuration**
- **Korn Shell Configuration**
- **Operating System Configuration**
- **Core File Naming Configuration**

Administrative User Configuration

The administrative user (for example, nmsadmin) owns and controls the services. The administrative user also owns and maintains the binaries, and all the configuration standards.

The Administrative Unix user:

- Owns the Isis release directories.
- Starts and stops Isis processes.
- Performs installs.
- Owns the executable directories.
- Has read-write permissions to the production database.
- Owns the service processes (DBService, MTService, etc.) and performs ALL sms_start.ces commands.

Creating an Administrative User

The administrative user, as the name implies, has central control over many critical aspects of the Oracle Utilities Network Management System. This user is the central controller of:

- Isis: configuration and starting and stopping of the Isis processes. See the *Oracle Utilities Network Management System Configuration Guide* for information on configuring Isis.
- Oracle Utilities Network Management System services: stopping and starting services and administering service logs.
- Oracle Utilities Network Management System files: binaries, configuration files.
- Database connection having read/write privileges.
- Model-building data.

It should be noted that for data security, Oracle Utilities Network Management System tools that can be used to directly modify data are installed with permissions set so that only the administrative user is allowed to execute them.

The administrative user has access to critical components of the system. This user owns and maintains the services, the starting of the services, model building, binaries, the database, and the configuration standards. The administrative user maintains the Oracle Utilities Network Management System Unix-based configuration and executables in one location. The administrative user is configured with an Oracle Wallet and the environment variable $RDBMS_HOST, which points to the ORACLE production tablespace. Thus, when the Oracle Utilities Network Management System daemon services are started, the administrative user has the necessary read/write access to the production schema.

Korn Shell Configuration

Oracle Utilities Network Management System uses the Korn Shell to set environment variables and provide the command line interface to the operating system. The Korn Shell, also referred to as ksh, standardizes command line execution and requests, such as running scripts, executing applications, and operating the services. The Korn Shell uses a file called .profile to configure itself. The administrative account needs to have:

- Its default shell set to ksh.
- Its .profile configured to source the Oracle Utilities Network Management System configuration file (.nmsrc).

For your convenience, templates of a generic .profile and .nmsrc file are included in the Oracle Utilities Network Management System software distribution, under $CES_HOME/templates. These files can be copied to $NMS_HOME/.profile and $NMS_HOME/.nmsrc and then modified to suit your installation.

.profile Configuration

The Korn Shell .profile is a hidden file that exists in the user's home directory. When a user logs in, this file executes, setting environment variables and defining terminal configuration. The following is required for setting up .profile or the Oracle Utilities Network Management System administrative user.

Edit the .profile file to source the user environment configuration file (.nmsrc) by adding the following line to the end of the file (using any text editor).

```
. ~/.nmsrc
```

This runs .nmsrc in the current shell and initializes all of the environment variables within the .nmsrc file in the current working environment.

The .profile file must also execute correctly when called from another script, as well as when the user logs in at a terminal. Anything in .profile that is terminal-specific should be placed in an "if" clause to suppress execution if the .profile is not being run from a terminal.

```
# Set a variable to be true when .profile is
# being run from a terminal rather than a script.
#
if tty -s
then
TTY=true;
else
TTY=false;
fi
#
# Protect items that must only be run from a
# terminal and not from a script.
#
if $TTY
then
stty Compaq
tset -I -Q
PS1="`hostname`>"
fi
```

Executables/Run-Times

The Oracle Utilities Network Management System Unix-based software is installed in the product home directory ($CES_HOME/bin). When commands are entered at the prompt, the shell looks for the appropriate bin directory for a matching program. The PATH environment variable determines where the shell looks for the bin directory, so PATH must be modified to include the location of the Oracle Utilities Network Management System software. It is defined in the .nmsrc file located in the user's home directory and it may contain multiple path names, each separated with a colon (:). The shell parses each path name until the corresponding program is located or each path name is exhausted.

> **WARNING!** The .nmsrc file sets up the PATH environment variable to ensure that the correct executables are discovered in the correct order. If you need to modify the PATH environment variable, it should be done in the .profile, after the .nmsrc is run, and you should only append directories to the end of the list. Doing otherwise could cause problems with your system.

Operating System Configuration

A standard operating system installation will often not be optimally configured to work with an Oracle Utilities Network Management System. Sometimes the user will spawn more processes than allowed by the standard kernel configuration. Other times, a map file may require a larger data segment than the average user. Due to problems like these, you may find that you will have to tweak the operating system configuration, which may include reconfiguring the kernel or some other part of your Unix system.

The values that are specified in this guide are examples only, as the correct values depend on how large your operating model is, how you use the system (*e.g.*, as a server, app-server, or client) and what kind of a load is placed on the system. This section should give you an idea of how to change components of the operating system that frequently become a problem running Oracle Utilities Network Management System.

Note on Oracle Support Policy on VMWare: Refer to My Oracle Support knowledge base article 249212.1 for Oracle's support policy on VMWare.

Linux

In Linux, limits to data segment size and the number of files available to the user are defined by the ulimit command. For the most part, these parameters do not need to be tweaked, but should you need to, you can run:

```
$ ulimit -d <datasegment size in kilobytes>
```

(Usually 256 MB will be enough)

```
$ ulimit -n <number of file descriptors>
```

(Usually 1024 will be enough)

Solaris

In Solaris, limits to data segment size and the number of files available to the user are defined by the ulimit command. For the most part, these parameters do not need to be tweaked, but should you need to, you can run:

```
$ ulimit -d <datasegment size in kilobytes>
```
`256 Mb` (usually sufficient)

```
$ ulimit -n <number of file descriptors>
```
`1024` (usually sufficient)

AIX

AIX sets its limits in a system configuration file called /etc/security/limits. You can type "man limits" from the command line for the documentation on how to modify this file. The following table describes the parameters you may have to modify.

Parameter Name	Description
`Nofiles`	The soft limit on the number of open file descriptors
`nofiles`	The hard (upper) limit on the number of open file descriptors
`data`	The soft limit on data segment size
`data_hard`	The hard (upper) limit on data segment size

Users can adjust these parameters using the ulimit command, as long as the parameters are below the hard limit configuration. If your parameter requirements are under the hard limit, you may

want to consider adding the appropriate ulimit command to the .nmsrc file instead of modifying the limits file. For example, adding a line that states ulimit -d 262144 would set the data segment size limit to 256 MB; having it in the .nmsrc file would ensure that the limit is set correctly each time the user logs in.

In addition, AIX supports a range of "network options" that may need to be tuned for optimal performance. Specifically, it is generally recommended to set the following AIX network options (via root on the AIX server).

```
$ no   -p -o rfc1323=1
$ no   -p -o sb_max=2097152
$ no   -p -o tcp_sendspace=524288
$ no   -p -o tcp_recvspace=262144
$ no   -p -o udp_sendspace=65536
$ no   -p -o udp_recvspace=655360
$ no   -r -o ipqmaxlen=512
```

Core File Naming Configuration

Standard Unix configuration generally names core files as "core" and places it in the directory where the executable was executed. This is problematic because the core file will get overwritten if another core file is generated, which will destroy information that could possibly be used to better track down the source of the problem. Fortunately, there are operating specific steps to have core files be saved with process specific names.

Linux

Note the following may be the default on the Linux distributions supported by Oracle Utilities Network Management System.

```
echo "1" > /proc/sys/kernel/core_uses_pid
```

You should also check to that the ulimit for core files is set to unlimited; otherwise no core or a truncated core file may be created:

```
ulimit -c unlimited
```

Solaris

As the root user, edit `/etc/coreadm.conf`:
`(COREADM_INIT_PATTERN=core.%p)`

Or run:
`coreadm -i "core.%p"`

AIX

Add the following to your .nmsrc file:
`export CORE_NAMING=true`

Or, as the root user (if you want to change it for the entire system), run:
`chcore -n on -d`

Note: See the chcore man page for more information.

Chapter 3

System Installation

This chapter describes the Oracle Utilities Network Management System installation. Topics include:

- **Installation Steps**
- **Upgrading from a Previous Release (NMS v1.11.0.x or Earlier)**
- **Installing Oracle Utilities Network Management System Software**
- **Installing BI Publisher for Web Switching**
- **Installation, Project Configuration, and Runtime Directory Structure**
- **Oracle Utilities Network Management System WebLogic Administrative Actions**
- **Troubleshooting Oracle Utilities Network Management System**

Installation Steps

Before you begin installing Oracle Utilities Network Management System, ensure that you have read and met all pre-installation requirements identified in the previous chapters. Those chapters contain important information with which you must be familiar before you begin the installation so you can avoid potential problems during the installation.

- If this is a first-time installation of Oracle Utilities Network Management System software, follow all steps in this guide starting with **Installing Oracle Utilities Network Management System Software** on page 3-5.
- If you are applying a 1.12 service pack to an existing Oracle Utilities Network Management System v1.12 installation, follow the steps outlined in **Applying an NMS v1.12 Service Pack** on page 3-4.
- If you are upgrading from a previous Oracle Utilities Network Management System software release, follow the steps outlined in **Upgrading from a Previous Release (NMS v1.11.0.x or Earlier)** on page 3-2.

Upgrading from a Previous Release (NMS v1.11.0.x or Earlier)

Upgrading the Oracle Utilities Network Management System should be done on a test system prior to attempting an upgrade on a production system. Make a complete copy of the production system on a test system, including the file system and the database. Once the test system is running, follow the steps below to upgrade your test system to Oracle Utilities Network Management System Release 1.12.0.1. Follow the instructions based on what release you currently have implemented. When satisfied with your test system, complete these same steps to upgrade your production system.

1. Log in as the administrative user (*e.g.*, nmsadmin).
2. Stop all services including Isis using the following command:

   ```
   $ sms_stop.ces –ai
   ```

   or, if your system does not support the sms_stop script, use:

   ```
   $ Action any.any stop
   $ cmd shutdown
   ```

3. Make sure the Naming Service is not running.

   If you are upgrading from 1.10 or earlier run:

   ```
   $ ps -ef | grep Naming_Service
   ```

   If you are upgrading from 1.11, run:

   ```
   $ ps -ef | grep tao_cosnaming
   ```

   If the Naming Service is running, output similar to the following is displayed:

   ```
   nmsadmin 348204  1  0  Aug 11   -  0:46 /opt/oms-9.1/bin/
   Naming_Service -p /users/oms1/logs/Naming_Service.pid iiop://
   server.example.com:17821 –ORBEndpoint
   ```

   If a process is running *(i.e.*, user = nmsadmin), kill it:

   ```
   $ kill 348204
   ```

4. Stop the currently running Java application server.
5. If you are upgrading from a release of 1.9 or earlier, and have a deprecated isis run_isis directory in any location other than $NMS_HOME/etc/run_isis, you have two options:

   Option One (Most common): If you plan to run a single NMS server system (not including web servers), remove the deprecated run_isis directory using this command:

   ```
   $ rm -rf $NMS_HOME/oms/run_isis
   ```

   Option Two (Advanced):
   If you plan to run multiple NMS server systems, you will need to move your run_isis files from the deprecated directory to the new directory location using the following commands:

   ```
   $ mkdir -p $NMS_HOME/etc/run_isis
   $ mv $NMS_HOME/oms/run_isis/isis.* $NMS_HOME/etc/run_isis
   $ rm -rf $NMS_HOME/oms/run_isis
   ```

   > **Note:** Verify that your isis.prm and isis.rc files do not require any changes based on the template files $CES_HOME/templates/isis.prm.template and $CES_HOME/templates/isis.rc.template.

6. Complete all steps in **Installing Oracle Utilities Network Management System Software** on page 3-5.

   Note: This release uses new templates to help properly configure the software. Please pay careful attention to ensure you use the new templates and their settings.

7. Complete all steps in **Starting Isis** on page 3-6.

8. If your Oracle database version is supported by Oracle Utilities Network Management System 1.12.0.1, you can skip the **Create Database Environment** section. Otherwise, do the following:

   - Backup your current Oracle Utilities Network Management System database.
   - Install the new version of the Oracle RDBMS.
   - Complete all steps in **Create Database Environment** on page 3-7, matching the configuration of your previous RDBMS instance.
   - Import your current Oracle Utilities Network Management System database onto the new RDBMS installation.

9. Complete setting up the project configuration directory and upgrading your model following the steps below:

   - If you have not already done so, move your project configuration files into the $NMS_CONFIG directories as described in **Oracle Utilities Network Management System Project Configuration Directory** on page 3-30.
   - Execute the nms-install-config script, which will merge your project configuration with the product configuration and place the results in the runtime directory:

     ```
     $ nms-install-config --nojava
     ```

10. Follow the procedures in **Appendix A-Updating Configuration and Performing Migrations for a New Release**.

11. Execute step 6 of **Oracle Utilities Network Management System Validation Model Setup** on page 3-8 to enable write permissions for the user that runs the Java Application Server

12. Complete all steps in **Web Application Configuration** on page 3-13.

13. Complete all steps in **Starting Services** on page 3-17.

14. Complete all steps in the **WebLogic Server Runtime Configuration** on page 3-17.

15. Complete all steps in **Deploying Oracle Utilities Network Management System in WebLogic Server** on page 3-26.

16. If you will be using the web client application installers, complete all steps in **Installing Oracle Utilities Network Management System Web Clients** on page 3-27.

Applying an NMS v1.12 Service Pack

The following steps should be followed when upgrading to a new service pack.

1. Log in as the administrative user (e.g., nmsadmin).
2. Stop all services including Isis:

   ```
   $ sms_stop.ces -ai
   ```

3. Make sure the TAO Naming Service is not running:

   ```
   $ ps -ef | grep tao_cosnaming
   ```

   If the TAO Naming Service is running, output similar to the following is displayed:

   ```
   nmsadmin 348204 1 0 Aug 11 - 0:46 tao_cosnaming -p /users/oms1/
    logs/Naming_Service.pid iiop://server.example.com:17821  -
    ORBEndpoint
   ```

   If a process is running *(i.e.*, user = nmsadmin), kill it:

   ```
   $ kill 348204
   ```

4. Stop the domain server where Oracle Utilities Network Management System is deployed in WebLogic Application Server.
5. Install the Oracle Utilities Network Management System software by completing steps 1-6 in **Installing Oracle Utilities Network Management System Software** on page 3-5.
6. Modify the ~/etc/system.dat file and update your .nmsrc file by completing steps 7-12 in **Installing Oracle Utilities Network Management System Software** on page 3-5.

   Note: The environment variable $CES_HOME changes when applying a service pack release.

7. If you do not yet have your own custom configuration and network model but are migrating an OPAL test database, complete step 4 in **Oracle Utilities Network Management System Validation Model Setup** on page 3-8.
8. Complete the steps in **Web Application Configuration** on page 3-13.
9. Start Isis by completing all steps in **Starting Isis** on page 3-6.
10. Execute the nms-install-config script, which will merge your project configuration with the product configuration and place the results in the runtime directory:

    ```
    $ nms-install-config --nojava
    ```

11. Follow the procedures in **Appendix A**-**Updating Configuration and Performing Migrations for a New Release**.
12. Execute the nms-install-config script to build the Java configuration:

    ```
    $ cd
    $ nms-install-config --java
    ```

13. Complete all steps in **Starting Services** on page 3-17.
14. To redeploy the web applications in WebLogic Application Server, complete all steps in **Deploying Oracle Utilities Network Management System in WebLogic Server** on page 3-26.

Installing Oracle Utilities Network Management System Software

Use the following procedures to install Oracle Utilities Network Management System software.

1. Log in as the administrative user (*e.g.*, nmsadmin).
2. Set the NMS_ROOT, NMS_HOME, and CES_HOME environment variables. For example:

   ```
   $ export NMS_ROOT=/users/nmsadmin
   $ export NMS_HOME=/users/nmsadmin
   $ export CES_HOME=$NMS_ROOT/nms/product/1.12.0.1
   ```

3. Set the ORACLE_HOME environment variable. For example:

   ```
   $ export ORACLE_HOME=/users/oracle/product/11.2.0
   ```

4. Set the JAVA_HOME environment variable to the 64-bit JDK installation directory. For example:

   ```
   $ export JAVA_HOME=/opt/java7
   ```

5. Unzip the Oracle Utilities Network Management System "Base Software" zip file. For example:

   ```
   $ unzip /path/to/filename.zip
   ```

6. Run the install script:

   ```
   $ cd network
   $ ./nms-install
   ```

   Note: this could take several minutes to complete.

7. Remove the installation files before continuing:

   ```
   $ cd ..
   $ rm –rf network
   ```

8. If you already have an existing .profile, then add the following line to the bottom of .profile:

   ```
   . $NMS_HOME/.nmsrc
   ```

   This ensures that your environment is set correctly at login.

9. Execute the following commands to copy the templates from $CES_HOME/templates directory to $NMS_HOME/etc. If you have existing files in $NMS_HOME/etc, they will be backed up to <file>.bak.<timestamp>.

   ```
   $ export OMS_PREFIX=$CES_HOME/3rdparty
   $ $OMS_PREFIX/jython/bin/jython $CES_HOME/bin/nms-install-
     templates
   ```

10. If you have an existing Oracle Utilities Network Management System resource file with a name other than `$NMS_HOME/.nmsrc` (*i.e.*, .ces.rc, .cesrc, …), rename it to `$NMS_HOME/.nmsrc`. Move all project-specific environment variables out of the `.nmsrc` file into your .profile file or another resource file.
11. Change the environment variables set in the `$NMS_HOME/.nmsrc` file using the nmsrc configuration script by executing this command:

    ```
    $ $CES_HOME/bin/config_nmsrc.pl
    ```

    Set each variable as appropriate for your environment.

    Notes:

    - **Default Values**

      The first time you run config_nmsrc.pl you will need to pay close attention to the values that are presented to you as defaults, and ensure that they are set correctly. During subsequent runs you will be presented with the current settings for each

variable as the default, and can simply press return at each prompt, reducing the time it takes to run the script.

When config_nmsrc.pl runs, it will flag variables that are not set to the defaults from the standard template. We encourage the use of defaults as much as possible to help facilitate customer support. However, it is up to the customer to decide if deviating from the defaults is appropriate for their environment.

- **Oracle Wallet Security Configuration**

  All projects have to configure and maintain Oracle wallets for each Unix user that starts services that connect to the database.

  The script prompts you to choose your wallet location, which sets the `TNS_ADMIN` environment variable (default: `~/etc/wallet`). Then it asks you to create passwords and enter the database credentials. Your new Oracle wallet will then map the `RDBMS_HOST` environment variable to a user name and password stored in the wallet.

  `IVR_RBDMS_HOST`, `CES_BI_INSTANCE`, and `CES_REP_INSTANCE` all need wallet credentials if you are using IVR and BI. If any of these use the same database instance, you will also create additional tnsnames.ora entries so each has a unique alias for the same database instance, thus, providing separate wallet credentials for the different users.

  SwService uses a separate Oracle wallet to store credentials it uses to connect to WebLogic Server. The script prompts you to choose a wallet location, and then sets the `NMS_WALLET` environment variable (default: `$NMS_HOME/etc/nms_wallet`). If the wallet does not exist it will be created. In that case you will be prompted to create the wallet password. Then the script asks you to enter credentials to be used by SwService.

  This script should be run for each Unix user that runs NMS services.

  WARNING: After running `config_nmsrc.pl`, you must log out and log back in to set the environment variables.

12. After making the above changes, log out and log in to set the environment variables. For a list of environment variables set by config_nmsrc.pl and their descriptions, see the "Environment Configuration" chapter of the *Oracle Utilities Network Management Systems Configuration Guide*.

Starting Isis

Please refer to the "Isis Configuration" chapter of the *Oracle Utilities Network Management System Configuration Guide* for details on configuring and optimizing Isis.

1. Start Isis, as follows:

   ```
   $ nms-isis stop
   ```

   ```
   $ nms-isis start
   ```

2. When complete (which will take approximately one minute), type:

   ```
   $ nms-isis status
   ```

   This determines if Isis has successfully started and will return 1 if isis is running, 0 if isis is not running.

Create Database Environment

Note: this procedure is only necessary if you do not have an existing Oracle Utilities Network Management System database.

Use the following procedure to create a database environment: for an Oracle Utilities Network Management System.

1. Copy the nms_role.sql.template file to a a project specific directory where you can save configuration files that you only run when you are creating new NMS instances. The resulting nms_role.sql file defines the necessary Oracle roles to support an NMS instance. Read the comments in the file regarding recommended use. For most projects the contents of this file should not need to be modified and it can be executed essentially as is.

   ```
   $ mkdir $NMS_HOME/my_sql

   $ cp $CES_HOME/templates/nms_role.sql.template
     $NMS_HOME/my_sql/nms_role.sql

   $ cd $NMS_HOME/my_sql

   $ sqlplus system/<system_passwd>@$RDBMS_HOST < nms_role.sql
   ```

   If this is the first time you have run this, you may see errors about dropping roles that do not exist, which can generally be safely ignored. To be sure run the file in again and make sure there are no errors on the second attempt (the script should drop and create the required roles without error).

   Note this step, the process of defining NMS roles, should only be executed once per Oracle RDBMS instance that is supporting one or more NMS instances.

2. Read through the comments in the nms.sql.template file. This file **must** be modified for your installation - often significantly. It is a template for creating the necessary Oracle usernames and tablespaces to support an Oracle NMS instance.

   For example, if your company name is Oracle Gas & Electric (oge), you might create a copy of the template for a test NMS instance like this:

   ```
   $ cp $CES_HOME/templates/nms.sql.template $NMS_HOME/my_sql/
     oge_nms_test.sql
   ```

3. Edit *oge*_nms_test.sql and follow the instructions (included as comments in the file) to suit your environment.

4. Run nms.sql as follows:

   ```
   $ cd $NMS_HOME/my_sql
   $ sqlplus sys/<system_passwd>@$RDBMS_HOST as sysdba <
     oge_nms_test.sql
   ```

   If this is the first time you have run this, you may see errors about objects that already exist (or may not exist), which can generally be safely ignored. To be sure, run the file in again and make sure there are no errors on the second attempt. On the second attempt the script should drop and create Oracle usernames and tablespaces without error.

5. Log in as the Oracle Utilities Network Management System Oracle RDBMS administrative user and test the connection to Oracle - using appropriate parameters based on what was provided in the oge_nms_test.sql file above. At the prompt, enter something similar to the following:

   ```
   $ sqlplus oge_nms_test/oge_nms_test_passwd@$ORACLE_SERVICE_NAME
   ```

   If the connection is successful, a `SQL>` prompt will appear. Enter `exit` to return to the shell prompt.

6. Log in as the Oracle Utilities Network Management System Oracle RDBMS read-only user and test the connection to Oracle - using appropriate parameters based on what was provided in the oge_nms_test.sql file above. At the prompt, enter something similar to the following:

   ```
   $ sqlplus oge_nms_test_ro/
     oge_nms_test_ro_passwd@$ORACLE_SERVICE_NAME
   ```

   If the connection is successful, a `SQL>` prompt will appear. Enter `exit` to return to the shell prompt.

Oracle Utilities Network Management System Validation Model Setup

Use the following procedure to install an Oracle Utilities Network Management System installation verification network data model:

1. If you do not have an existing network data model to load at this point, you can use the OPAL validation model included in the Oracle Utilities Network Management System release.
2. Log in as the administrative user and run config_nmsrc.pl setting the following variables:

   ```
   CES_SITE="OPAL product ces"
   SYMBOLOGY_SET=${OPERATIONS_MODELS}/SYMBOLS/OPAL_SYMBOLS.sym
   NMS_CONFIG=$NMS_HOME/OPAL
   ```

3. Log out and log back in again, ensuring the variables are set correctly.

Note: If you have previously installed the validation model, you should backup any existing local modifications before proceeding to step 4.

```
$ mkdir ~/OPAL-backup
$ cd $NMS_CONFIG
$ cp sql/OPAL_parameters.sql jconfig/build.properties
jconfig/build.xml jconfig/nms*keystore jconfig/global/nms-
client.keystore jconfig/global/properties/
CentricityTool.properties jconfig/server/
CentricityServer.properties ~/OPAL-backup/.
```

---

4. Copy the OPAL configuration in $CES_HOME to NMS_CONFIG:

   ```
   $ cd $NMS_HOME
   $ rm -rf $NMS_CONFIG
   $ cp -r -L $CES_HOME/OPAL $NMS_CONFIG
   ```

5. Run nms-make-symbols, nms-install-config, and ces_setup.ces script to load the schema and configuration, as follows:

   ```
   $ nms-make-symbols
   $ nms-install-config --nojava
   $ ces_setup.ces -clean -reset
   ```

6. Enable write permissions for the user that runs the Java Application Server (e.g., wls) such that the user can create files in the $OPERATIONS_MODELS/ser directory (typically $HOME/data/ser). This is done to enable the distribution of maps to web clients through the application server.

   ```
   $ cd $OPERATIONS_MODELS
   $ mkdir ser
   $ su
     Password:
   # chown wls:users ser
   # exit
   ```

7. Load the sample data:

   ```
   $ LoadOPALModel.ces
   ```

   The script will load sql files, start a subset of Oracle Utilities Network Management System services, and then build the data model.

Spatial Landbase Map Installation (Optional)

Prerequisite: installation of OPAL Spatial Landbase Maps requires Oracle Fusion Middleware MapViewer Map Builder; see **Requirements for Spatial Landbase** on page 2-2 for details.

Use the following optional procedure to load the OPAL Spatial Landbase maps:

1. Unzip the OPAL spatial shapefiles and metadata file:

   ```
   $ cd $NMS_CONFIG
   $ unzip spatial_landbase.zip
   ```

2. Start Oracle Map Builder

   ```
   $ cd <directory where mapbuilder.jar is installed>
   $ run java -Xms200m -Xmx1000m -jar mapbuilder.jar
   ```

3. In Map Builder, select **File/New Connection…** Specify the connection information to connect to the server where the spatial data will be served. Then connect to the server.

4. In Map Builder, select **Tools/Import Shapefile…** and click **Next**.

   - Under Data Selection, select the **Multiple Files or Directories** and change the Selection drop down list to **Directory**.
   - Click **Select**; navigate to and **Open** the `$NMS_CONFIG/spatial_landbase` directory.
   - Click **Next**.
   - Set the SRID to 41100 (Ohio 3401, Northern Zone (1983, US Survey feet)), deselect **Append '_mb' to attribute names in new tables**, and deselect **Append records if table exists**.
   - Click **Next**, **Next**, and **Finish**.

5. Import the metadata for the spatial map data. In MapBuilder, select **Tools/Import Metadata**.

   - Click **File**; navigate to and **Open** the `NMS_CONFIG/spatial_landbase/SpatialMetadata.dat` file.
   - Select **Styles**, **Themes**, and **Base Maps**, and then click **Ok**.

6. Verify that the OPAL spatial landbase maps and metadata loaded correctly.

   - In the MapBuilder left panel, which lists the Metadata directory, expand the **Base Maps** directory and double click the **PRODUCT_PROJECTED_LANDBASE Base Map** icon.
   - From the main panel, in the **PRODUCT_PROJECTED_LANDBASE** top tab, select the **Preview** lower tab, then click the green "**Play**" icon. You should see OPAL landbase data appear in the preview panel.

   Remember to set up a new Generic Data Source in the Oracle WebLogic Server Runtime Configuration to include a name like **`JDBC Data Source-spatial`** with a JNDI name: **`jdbc/spatial`** pointing to the same database as the jdbc/intersys connection.

Spatial Outage Summary Installation (Optional)

This optional installation procedure provides support for displaying spatial outage summary information in the Oracle Utilities Network Management System Web Viewer and supports the interface to Oracle Utilities Customer Self Service.

1. Install the optional Spatial Landbase Maps (from the previous section).
2. Copy `$CES_HOME/dist/baseconfig/product/ops/viewer/xml/` **`SPATIALLAYERS_SPATIAL_BG_LAYERS.inc`** to `$NMS_CONFIG/jconfig/ops/viewer/xml/.`
3. Change `PRODUCT_PROJECTED_LANDBASE` to **`CSS_PROJECTED_LANDBASE`** as shown below:

```
<!-- Used in SpatialLayers.xml
     Used to define the connection string for Oracle WebLogic Server (WLS)
     to the spatial server -->
<SpatialBGLayers>
 <!-- jndi_name is the jndi name of the container managed datastore
     This is only supported for WLS. For JBoss, the connection
     information must be defined in ces_parameters. -->
 <SpatialBGLayer datasource_name="spatial" jndi_name="jdbc/spatial"
  basemap_name="CSS_PROJECTED_LANDBASE" viewer_layer_name="spatial_landbase"/>
</SpatialBGLayers>
```

4. Run the setup script for the OPAL outage summary views:

   ```
   $ OPAL_CSS_setup.ces
   ```

5. Edit the $NMS_HOME/etc/system.dat file by adding or changing the **`program TSService`** line to have the **`outageSumScript`** and **`outageSumPeriod`** parameters:

   ```
   program TSService TSService -outageSumScript $NMS_HOME/bin/
   OPAL_CSS_refresh.ces -outageSumPeriod 1
   ```

   For demonstration environments, the recommended outageSumPeriod is 1 (minute); for production environments, a value of 10 to 15 is recommended.

6. Remove the **#** (comment) sign at the beginning of the line:

   ```
   #instance  <local> TSService
   ```

7. Save the file.
8. Stop and restart SMService:

   ```
   $ Action any.SMService+TSService stop
   $ sms_start.ces
   ```

9. If you are adding this optional feature after installing and configuring the web application server (described in the sections starting with **Web Application Configuration** on page 3-13), install your new java configurations using the following command:

   ```
   $ nms-install-config --java
   ```

   Re-deploy and restart the Web Application in WebLogic NMS. Otherwise you will complete this process in the following sections.

Web Map Server Connection (Optional)

This optional installation procedure provides support for displaying internet web map server landbase maps in the Oracle Utilities Network Management System Web Viewer. For details on configuring popular web map servers, search the Oracle Support Knowledge Base for NMS Web Map Server Configuration. The following instructions are an example of configuring two generic map servers (`mapsrv1` and `mapsrv2`) with two different types of maps from each server (road and aerial):

1. Edit or create a project configuration of the `DLG_VIEWER_HIDE_DISPLAY_en_US.properties` file in `$NMS_CONFIG/jconfig/ops/viewer/properties`:

   ```
   $ mkdir -p $NMS_CONFIG/jconfig/ops/viewer/properties
   $ vi $NMS_CONFIG/jconfig/ops/viewer/properties/
   DLG_VIEWER_HIDE_DISPLAY_en_US.properties
   ```

   > **Note:** see the "Viewer Configuration" section in the "Java Application Configuration" chapter of the *Oracle Utilities Network Management System Configuration Guide* for other Hide/Display configuration options.

2. Add the following lines to the end of the `DLG_VIEWER_HIDE_DISPLAY_en_US.properties` file and save it. These will be the labels in the Web Viewer Hide/Display Spatial Landbase pulldown:

   ```
   CHBOX_HD_SPATIAL_MAPSRV1_ROAD.text = Mapsrv1 Road
   CHBOX_HD_SPATIAL_MAPSRV1_AERIAL.text = Mapsrv1 Aerial
   CHBOX_HD_SPATIAL_MAPSRV2_ROAD.text = Mapsrv2 Road
   CHBOX_HD_SPATIAL_MAPSRV2_AERIAL.text = Mapsrv2 Aerial
   ```

3. If you don't have a project version of the `SPATIALLAYERS_SPATIAL_BG_LAYERS.inc` file in `$NMS_CONFIG/jconfig/ops/viewer/xml`, copy the product file to your configuration directory:

   ```
   $ mkdir -p $NMS_CONFIG/jconfig/ops/viewer/xml
   $ cp \
   $CES_HOME/dist/baseconfig/product/ops/viewer/xml/
   SPATIALLAYERS_SPATIAL_BG_LAYERS.inc \
   $NMS_CONFIG/jconfig/ops/viewer/xml
   ```

4. Change the project version of the `SPATIALLAYERS_SPATIAL_BG_LAYERS.inc` file to have `SpatialBGLayers` referencing the Map Servers you wish to configure, for example:

   ```
   <SpatialBGLayers>
     <SpatialBGLayer provider="web1" basemap_name="roadmap"
   viewer_layer_name="mapsrv1_road"
   misc_params="&amp;style=lightness:10.0"/>
     <SpatialBGLayer provider="web1" basemap_name="hybrid"
   viewer_layer_name="mapsrv1_aerial"
   misc_params="&amp;style=lightness:10.0"/>
     <SpatialBGLayer provider="web2" basemap_name="road"
   viewer_layer_name="mapsrv2_road"/>
     <SpatialBGLayer provider="web2" basemap_name="aerialwithlabels"
   viewer_layer_name="mapsrv2_aerial"/>
     <SpatialBGLayer datasource_name="spatial" jndi_name="jdbc/
   spatial" basemap_name="PRODUCT_PROJECTED_LANDBASE"
   viewer_layer_name="oracle"/>
     <SpatialBGLayer datasource_name="spatial" jndi_name="jdbc/
   spatial" basemap_name="CSS_PROJECTED_LANDBASE"
   viewer_layer_name="oracle_with_outage_summary"/>
   </SpatialBGLayers>
   ```

5. If you don't have a project version of the DLG_VIEWER_HIDE_DISPLAY_DECLUTTER.inc file in $NMS_CONFIG/jconfig/ops/viewer/xml, copy the product file to your configuration directory:

```
$ mkdir -p $NMS_CONFIG/jconfig/ops/viewer/xml
$ cp \
$CES_HOME/dist/baseconfig/product/ops/viewer/xml/
DLG_VIEWER_HIDE_DISPLAY_DECLUTTER.inc \
$NMS_CONFIG/jconfig/ops/viewer/xml
```

6. Change the project version of the DLG_VIEWER_HIDE_DISPLAY_DECLUTTER.inc file to have COMBOBOX_HD_SPATIAL referencing the Map Servers and layers you wish to configure, for example:

```
  <ComboBox name="COMBOBOX_HD_SPATIAL">
    <ComboBoxPlacement start="1,relative" width="1" height="1"
weight="1,0"/>
    <ComboBoxBehavior
data_source="DS_VIEWER_DEFAULT.SPATIAL_COMBOBOX">
      <Editable initial="false"/>
      <Keys>
        <Key value="None"/>
        <Key value="Mapsrv1 Road"/>
        <Key value="Mapsrv1 Aerial"/>
        <Key value="Mapsrv2 Road"/>
        <Key value="Mapsrv2 Aerial"/>
        <Key value="Oracle"/>
        <Key value="Oracle with Outage Summary"/>
      </Keys>
      <SelectPerform>
        <Command value="RefreshCommand"/>
      </SelectPerform>
    </ComboBoxBehavior>
  </ComboBox>
```

7. If you don't have a project version of the CentricityServer.properties file in $NMS_CONFIG/jconfig/server, copy the product file to your configuration directory:

```
$ mkdir -p $NMS_CONFIG/jconfig/server
$ cp \
$CES_HOME/dist/baseconfig/product/server/
CentricityServer.properties \
$NMS_CONFIG/jconfig/server
```

8. Change the project version of the CentricityServer.properties file to have parameters referencing the Map Servers license keys and url information provided to you by your server, for example:

```
# http address:
# http base address required by the web map service
viewer.web1_maps_http_address = http://maps.mapsrv01apis.com/maps/
api/staticmap
viewer.web2_maps_http_address = http://dev.mapsrv02.net/REST/v1/
Imagery/Map
# http browser address:
# http base browser address
viewer.web1_maps_browser_http_address = http://maps.mapsrv1.com
viewer.web2_maps_browser_http_address = http://www.mapsrv2.com/
maps
# key:
# Key as provided by the web map service
viewer.web1_maps_key = AIabcdefghijklmnop00-4tABCDEFGHIJKLM4Fg
```

```
viewer.web2_maps_key = Avabcdefghijklmnopq-
sDABCDEFGHIJKLMNOPQRSTUVWXYZZZZ_b9999999999h
# logo:
# name of the logo image file of the map server
viewer.web1_maps_logo = mapsrv1-map-logo_sm.png
viewer.web2_maps_logo = mapsrv2_logo_sm.png
# This parameter will identify which map type server to use for
non-spatial
# map mode, value should be "web1" or "web2", when focusing in a
browser.
viewer.default_maps_browser_provider = web1
# These parameters are required to convert map geographic
coordinates to
# latitude/longitude values to request maps from map servers.
# Use the $OMS_PREFIX/data/MAPPING/coordsys.asc file as a reference
for
# valid values
viewer.geo_csmap_coordsys = OH83-NF
viewer.ll_csmap_coordsys = LL84
```

9. Place logo files (typically .png files) in the `$NMS_CONFIG/jconfig/global/images` directory matching the file names specified in the `viewer.web1_maps_logo` and `viewer.web2_maps_logo` values from the previous step.

10. If you are adding this optional feature after installing and configuring the web application server (described in the sections starting with Web Application Configuration below), install your new java configurations using the following command:

    ```
    $ nms-install-config --java
    ```

Re-deploy and restart the Web Application in WebLogic NMS. Please note, you may need to reconfigure your WebLogic application if you now need to configure for a proxy-server. Otherwise you will complete this process in the following sections.

Web Application Configuration

Before installing the web applications, follow these steps:

1. If you already have an existing *`$NMS_CONFIG/sql/NMS_PROJECT_parameters.sql`* file – where *`NMS_PROJECT`* is the name of your configuration project (*e.g.*, OPAL) – then move it aside for reference later:

   ```
   $ cp $NMS_CONFIG/sql/NMS_PROJECT_parameters.sql
        $NMS_CONFIG/sql/NMS_PROJECT_parameters.sql.bak
   ```

2. Copy the **`product_parameters.sql`** file to your $NMS_CONFIG sql directory:

   ```
   $ cp $CES_HOME/product/sql/product_parameters.sql
        $NMS_CONFIG/sql/NMS_PROJECT_parameters.sql
   $ cd $NMS_CONFIG/sql
   ```

3. Modify the following parameters in *`NMS_PROJECT_parameters.sql`* (if applicable, refer to the backup file you made in step 1):

   Note: The WebLogic Server (WLS) needs access to the **nmsadmin** data directory to get `*.mad/*.mac` files to turn into `*.ser` files for use by the NMS Viewer. The WLS can either be running on the same machine as the NMS services or on a different machine.

   - If the WLS is running on the same system (not normally done), the WLS can be configured to read the nmsadmin data files directly using a specific file path (`WEB_mapDirectory`) and setting `WEB_syncMaps = false`.

- If the WLS is running on a different server than the NMS services (normally recommended), then you will need to setup a httpd server and set `WEB_syncMaps = true`.

NFS does not work as a solution to make the remote NMS server data directory available to the WLS server. NFS can have delays getting files to the WLS meaning the NMS WLS can potentially read old map data causing the NMS Viewer maps to have errors or show incorrect data. You can either install and configure your own httpd server (e.g., Apache) or use the "lighttpd http server" that is shipped with the base NMS product. Usage of "lighttpd" is discussed in the following section. A script called "nms-lighttpd" may be used to start and stop the "lighttpd" process. This script is also shipped as part of the base NMS product and can be configured into your normal NMS startup/shutdown/restart process.

NMS_PROJECT_parameters.sql

Element	Description	Example
WEB_intersysName	The WEB_intersysName should match the implName of the CORBA gateway. Normally, InterSys_{user}.	InterSys_nmsadmin
WEB_syncMaps	If false, it will look for the maps using a file location specified in WEB_mapDirectory. If it is true, it will instead load the maps using http and a web server would have to be installed on the NMS server with the data directory exposed. A standard httpd server is provided with the NMS release and can be started with the `nms-lighttpd` command. Configure WEB_mapDirectory, WEB_mapHttpdPort, WEB_mapHttpdAllowedIPs, and WEB_tempDirectory before starting the httpd server.	true
WEB_mapDirectory	The location of the maps directory from the perspective of the Weblogic server. This can be either a file path or, if WEB_syncMaps is set to true, a location that starts with http://. If using the nms-lighttpd process, this would be set to: `http://<nms-server-name>:<WEB_mapHttpdPort>` Note: When WEB_syncMaps=false, WEB_mapDirectory is the same as $OPERATIONS_MODELS.	http://nms-vm:8888
WEB_mapHttpdPort	The port to use for the httpd server started with the nms-lighttpd command start process. This port must be an unique and available port on the NMS C++ Server system. If running multiple NMS environments on the same machine, please verify this value is unique for this machine.	8888
WEB_mapHttpdAllowedIPs	List of IP addresses where you will be running the WEB Application Servers that are allowed to access the map files from the httpd server. Separate the IP addresses by "|"s if there are multiple servers. This is used by the nms command start process. If this value is blank, it will not restrict any IP addresses from reading the map files.	192.168.107.128|192.168.107.1|127.0.0.1

Element	Description	Example

Note:
If you are using the "lighttpd" http server and make changes to WEB_mapDirectory, WEB_mapHttpdPort, or WEB_mapHttpdAllowedIPs, you can restart the http server using these commands:
`nms-lighttpd stop`
`nms-lighttpd start`		

WEB_tempDirectory	This is the directory to store map files if WEB_syncMaps is set to 'true.' Otherwise it is ignored.	/users/nmsadmin/dist/maps
WEB_corbaInitRef	The initial reference of the CORBA naming service. It is in the format of NameService=corbaloc:iiop:1.2@{host}:{port}/NameService The {host} and {port} should match the values of the NMS server's CORBA naming service.	NameService=corbaloc:iiop:1.2@server.example.com:17821/NameService
WEB_watermark	This is transparent text that will display across the windows of an application diagonally. It can be used to make it very obvious what environment you are currently a part of. If you do not wish to use this feature, do not define this value.	Production Test
WEB_envName	This is the name of the environment that will display in the main window header under the logged in users' name. It can either be the same value as the watermark or an additional name as desired, such as the name of the system.	Production Test
WEB_envType	This parameter specifies the NMS environment type. Currently, the recognized values are: • **training:** This environment type is required to use the Training Simulator. It allows Trainer user type and the creation/execution of Training Scenario sheets. • **production:** This environment type should be used in production. It disallows the Reset Model functionality (used by Training Simulator, but can be configured for use in non-production environments for testing purposes). Other values can be used, but do not have any effect other than indicating that this is neither a training nor production environment.	production

Note: The WEB_ *properties* may be set by adding a startup parameter to the WebLogic managed server's startup parameter. For example, to configured a watermark for a particular managed server, add this:

```
"-Dwatermark=Read Only System"
```

4. When the above changes have been made, run these commands:

```
$ cp $NMS_CONFIG/sql/NMS_PROJECT_parameters.sql $NMS_HOME/sql
$ ISQL.ces NMS_PROJECT_parameters.sql
```

5. Starting with Java SE 7 Update 21 in April 2013 all Web Start Applications like Oracle Utilities Network Management System are encouraged to be signed with a trusted certificate

for the best user experience. Please follow the steps in the "Security Certificates in NMS" section of the "Security Guide" chapter of the *Oracle Utilities Network Management Configuration Guide*.

For purposes other than Production, and if you do not have certificates issued by trusted certificate authorities, you may use the nms-gen-keystore script to generate self-signing certificates:

```
$ nms-gen-keystore
```

You will be prompted for your server name (as entered in a browser) and your organization.

> **Note:** Future update releases of Java will require changing Java security settings on the client to continue to run self-signed applications.

6. When using LDAP or Active Directory for authentication, all Oracle Utilities Network Management System users must exist in a defined group, which defaults to **nmsuser**. If you want to use a different group name, edit **$NMS_CONFIG/jconfig/build.properties** and change the following line (you may need to uncomment it):

   ```
   weblogic-ldap-group = nmsuser
   ```

   > **Note:** If the build.properties file does not exist in **$NMS_CONFIG/jconfig/**, you will need to create it. See "Create or Modify the Project build.properties File" section in the *Oracle Utilities Network Management System Configuration Guide* Java Application Configuration chapter for details.

   Another WebLogic group is needed for system and adapter use. It can be configured either in LDAP, or using the default authentication provider in WebLogic. The default name is *nms-service*. If you want to use a different group name, edit **$NMS_CONFIG/jconfig/build.properties** and change the following line (you may need to uncomment it):

   ```
   weblogic-service-group = nms-service
   ```

   Ensure that the **publisher.ejb-user**, which by default is **nms1**, is part of the **nms-service** group.

7. If you wish to change the default user (**nms1**), which the CORBA publisher will run as, edit **$NMS_CONFIG/jconfig/build.properties**. Change the following line (you may need to uncomment it) to a valid user, such as **nms2**:

   ```
   publisher.ejb-user = nms2
   ```

8. If you wish to configure WebLogic to not use SSL/HTTPS, then edit **$NMS_CONFIG/jconfig/build.properties**. Add or change (uncomment) the following line:

   ```
   option.no_force_https
   ```

9. If you will be running multiple instances of Oracle Utilities Network Management System, you will need to create JDBC Data Sources for each WebLogic managed server, each with a unique JNDI name (see WebLogic Runtime Configuration below). To change the JNDI name from the default of *jdbc/intersys*, edit **$NMS_CONFIG/jconfig/build.properties** and modify the following line (you may need to uncomment the line):

   ```
   config.datasource = jdbc/intersys/nmsadmin
   ```

10. If you are running the application as part of a WebLogic cluster, uncomment the following line:

    ```
    enable.cluster = true
    ```

11. Once all files are in place, build the configuration by running:

    ```
    $ cd
    $ nms-install-config --java
    ```

Starting Services

Use the following procedure to start full Oracle Utilities Network Management System services:

1. Log in as the administrative user and stop any services that might be running, as follows:

   ```
   $ sms_stop.ces -a
   ```

2. Run the sms_start.ces script to start services, as follows:

   ```
   $ sms_start.ces
   ```

3. To verify services are running, run **`smsReport`**, as follows:

   ```
   $ smsReport
   ```

WebLogic Server Runtime Configuration

For information on creating and installing to a WebLogic cluster, which requires the Enterprise edition of WebLogic, see the KM document 1911737.1:

https://mosemp.us.oracle.com/epmos/faces/DocumentDisplay?id=1911737.1

For information on using a customer provided load balancer, see KM document 1910405.1.

https://support.oracle.com/epmos/faces/DocumentDisplay?id=1910405.1

If you wish to use multiple instances of WebLogic, but not part of of a cluster or using a load balancer see 1215414.1 https://support.oracle.com/epmos/faces/DocumentDisplay?id=1215414.1

Create a Managed Server

1. Access the WebLogic Server Administration Console by entering the following URL:

   ```
   http://hostname:port/console
   ```

   Here hostname represents the DNS name or IP address of the Administration Server, and port represents the number of the port on which the Administration Server is listening for requests (port 7001 by default).

2. If you have not already done so, in the Administration Console's Change Center, click **Lock & Edit**.

3. In the left pane of the Console, expand Environment and select **Servers**.

4. Click **New**.

5. For the **Server Listen Address**, enter an IP address or DNS name that resolves to an IP address of the server.

6. Change the **Server Listen port** to an unused port.

7. Click **Finish**.

8. In the Servers table, click the server name to open the Settings page.

9. Click the **Tuning** tab.

10. If necessary, click **Advanced** to access advanced tuning parameters.

11. In the **Muxer Class** field, enter:

    ```
    weblogic.socket.NIOSocketMuxer
    ```

12. Click the **SSL** tab.
13. Click **Advanced** and check that the **Use JSSE SSL** checkbox is checked.
14. To activate these changes, in the Administration Console's Change Center, click **Activate Changes**.

Configure Database Connectivity

In WebLogic Server, you configure database connectivity by adding data sources to your WebLogic domain. To create a JDBC data source in your domain, you can use the Administration Console:

1. If you have not already done so, in the Administration Console's Change Center, click **Lock & Edit**.
2. In the **Domain Structure** tree, expand **Services**, then select **Data Sources**.
3. On the Summary of Data Sources page, click **New**, Generic Data Source.
4. On the JDBC Data Source Properties page, enter or select the following information:
   - **Name** - Enter a name for this JDBC data source.
     For example: `JDBC Data Source-nms`.
   - **JNDI Name** - Enter the JNDI path to where this JDBC data source will be bound. Use `jdbc/intersys` for the JNDI path.

     Note: If you will have multiple instances of Oracle Utilities Network Management System running from this WebLogic installation, make the JNDI name unique (*e.g.*, `jdbc/intersys/nmsadmin`) and change "config.datasource" in *`$NMS_CONFIG/jconfig/build.properties`* to match this string.
   - **Database Type** - Select Oracle for the DBMS of the database that you want to connect to.
   - Click **Next** to continue.
   - Select ***Oracle's Driver (Thin XA) for Instance connections, Versions: 9.0.1 and later** for the JDBC driver you want to use to connect to the database.
   - Click **Next** to continue.
5. On the Transactions Options page, click **Next** to continue.
6. On the Connection Properties page, enter values for the following properties:
   - **Database Name** - Enter the name of the database that you want to connect to. Exact database name requirements vary by JDBC driver and by DBMS.
   - **Host Name** - Enter the DNS name or IP address of the server that hosts the database.
   - **Port** - Enter the port on which the database server listens for connections requests.
   - **Database User Name** - Enter the database user account name that you want to use for each connection in the data source.
   - **Password/Confirm Password** - Enter the password for the database user account.
   - Click **Next** to continue.

7. On the Test Database Connection page, review the connection parameters and click **Test Configuration**.
   - WebLogic attempts to create a connection from the Administration Server to the database. Results from the connection test are displayed at the top of the page. If the test is unsuccessful, you should correct any configuration errors and retry the test.
   - If the JDBC driver you selected is not installed on the Administration Server, you should click **Next** to skip this step.
   - Click **Next** to continue.
8. On the **Select Targets** page, select the servers or clusters on which you want to deploy the data source.
9. Click **Finish** to save the JDBC data source configuration and deploy the data source to the targets that you selected.
10. Perform steps 4-10 for the read-only user. The JNDI path for the user should be the same as previously entered, but with a _readonly appended at the end. Therefore, the default should be jdbc/intersys_readonly. Be sure to use the read-only user credentials that were created earlier.
11. Perform steps 4-10 for the spatial database connection if your system uses spatial landbase in the Web Workspace Viewer. The JNDI path should be jdbc/spatial.
12. To activate these changes, in the Administration Console's Change Center, click **Activate Changes**.

Create a JMS Server in Your Domain

1. If you have not already done so, in the Administration Console's Change Center, click **Lock & Edit**.
2. In the Administration Console, expand **Services** and then **Messaging** and then select **JMS Servers**.
3. On the Summary of JMS Servers page, click **New**.

   Note: Once you create a JMS server, you cannot rename it. Instead, you must delete it and create another one that uses the new name.
4. On the Create a New JMS Server page:
   - In **Name**, enter a name for the JMS server. For example: JMSServer-nms.
   - In **Persistent Store**, leave this field set to **none**, then the JMS server will use the default file store that is automatically configured on each targeted server instance.
   - Click **Next** to proceed to the targeting page.
5. On the Selects Targets page, select the server instance or migratable server target on which to deploy the JMS server.
6. Click **Finish**.
7. To activate these changes, in the Administration Console's Change Center, click **Activate Changes**.

Create a JMS System Module in Your Domain

1. If you have not already done so, in the Administration Console's Change Center, click **Lock & Edit.**
2. In the Administration Console, expand **Services > Messaging** and select **JMS Modules**.
3. On the **Summary of JMS Modules** page, click **New**.

   Note: Once you create a module, you cannot rename it. Instead, you must delete it and create another one that uses the new name.
4. On the **Create JMS System Module** page:
   - In **Name**, enter a name for the JMS system module. For example: SystemModule-nms.
   - Click **Next** to proceed to the targeting page.
5. On the **Targets** page, select the server instance or cluster target on which to deploy the JMS system module, and then click **Next**.
6. On the **Add Resources** page, select the checkbox to immediately add resources to the newly created JMS Module.
7. Click **Finish**.
8. On the **Configuration** page, click **New** above the Summary of Resources table.
9. On the **Create a New JMS System Module Resource** page, select **Connection Factory** from the list of JMS resources and then click **Next**.
10. On the **Connection Factory Properties** page, define the connection factory's basic properties:
    - In **Name**, enter a name for the connection factory. For example: *`ConnectionFactory-nms`*.

      Note: Once you create a connection factory, you cannot rename it. Instead, you must delete it and create another one that uses the new name.
    - In **JNDI Name**, enter **`ConnectionFactory`**.
11. Click **Next** to proceed to the targeting page.
12. For basic default targeting, accept the default targets presented in the **Targets** box and click **Finish**. The configured connection factory is added to the module's Summary of Resources table, which displays its default targets.
13. On the **Configuration** page, click **New** above the Summary of Resources table.
14. On the **Create a New JMS System Module Resource** page, select **Distributed Topic** from the list of JMS resources, and then click **Next**.
15. On the JMS Distributed Destination Properties page, define the distributed topic's basic properties:
    - In **Name**, enter a name for the distributed topic. For example: `MsgBean-nms`.

      Note: Once you create a distributed topic, you cannot rename it. Instead, you must delete it and create another one that uses the new name.
    - In **JNDI Name**, enter *`topic/MsgBean`*.
16. Click **Next** to proceed to the targeting page.
17. For basic default targeting, accept the default targets presented in the Targets box and then click **Finish**. The JMS system module resource is added to the module's Summary of Resources table, which displays its default targets.
18. To activate these changes, in the Administration Console's Change Center, click **Activate Changes**.

Configure T3 Protocol

1. If you have not already done so, in the Administration Console's Change Center, click **Lock & Edit**.
2. In the left pane of the Console, expand **Environment** and select **Servers**.
3. On the **Servers** page, click on the server name.
4. Select **Protocols > General**.
5. In the **Maximum Message Size** field, enter **`50000000`**.

   Note: These settings apply to all protocols in the server's default network configuration.
6. Click **Save**.
7. To activate these changes, in the Administration Console's Change Center, click **Activate Changes**.

Configure the Arguments to Use When Starting a Server in Your Domain

1. If you have not already done so, in the Administration Console's Change Center, click **Lock & Edit**.
2. In the Administration Console, expand **Environment** and select **Servers**.
3. On the Servers page, click the name of the server.
4. Select the **Configuration** > **Server Start** tab.
5. On the **Server Start** page, add the following JVM parameters:

```
-Xms4096m
-Xmx4096m
-XX:PermSize=512m
-XX:MaxPermSize=512m
-XX:+UseConcMarkSweepGC
-XX:+ExplicitGCInvokesConcurrent
-javaagent:lib/nms_monitor.jar
-Doracle.xdkjava.security.resolveEntityDefault=false
-d64
```

If it is desired that the hostname be something other than what the operating system returns, add a startup flag to the app server:

```
-Dnms.servername=server_name
```

Replace *server_name* with the name you wish to log. Overriding the name may be helpful if multiple app servers are on the same machine.

If using a web map server to supply web maps to the web viewer, and if your WebLogic system requires a proxy server to access the external web map server, and if the system you are running WebLogic on does not have a system wide proxy server configuration, you will need to configure WebLogic to access the web map server using your network proxy server using the JVM start up parameters. See http://docs.oracle.com/javase/7/docs/technotes/guides/net/proxies.html for details on configuring the JVM for proxies. Typically, to configure the JVM to use a proxy server, you will need to set JVM startup parameters:

- If the web map server uses http:

```
-Dhttp.proxyHost=proxy-hostname
-Dhttp.proxyPort=port#
-Dhttp.nonProxyHosts=
 host1|host2|192.168.107.*|localhost|127.0.0.*
```

- If web map server uses https:

```
-Dhttp.proxyHost=proxy-hostname
-Dhttp.proxyPort=port#
-Dhttp.nonProxyHosts=
 host1|host2|192.168.107.*|localhost|127.0.0.*
```

List the host names, IP addresses, or IP masks to any local system your JVM will need access to that does not require the proxy server. Be sure to include your local machine, DB system, and NMS core server system at a minimum. The nonProxyHosts lines cannot contain quotes or the managed server startup will fail.

Web Switching Singleton Service

The Web Switching Singleton Service is used to process Web Switching specific requests like creating Open and Close Miscellaneous Log steps for SCADA actions. It also processes model verification updates to steps that have been involved in model changes. (This service is disabled when the product *WebSwitching* is not licensed.)

1. If you have a non-clustered project environment where multiple application servers are running, add the following command line argument for the non-Web Switching instances:

```
-Dnms.disable-swman-static-service=true
```

2. Click **Save**.
3. To activate these changes, in the Administration Console's Change Center, click **Activate Changes**.

Configure Keystores

Before You Begin

- Obtain private keys and digital certificates from a reputable certificate authority such as Verisign, Inc. or Entrust.net.
- Create identity and trust keystores.
- Load the private keys and trusted CAs into the keystores.

Configure the Identity and Trust Keystores

1. If you have not already done so, in the Administration Console's Change Center, click **Lock & Edit.**
2. In the left pane of the Console, expand **Environment** and select **Servers.**
3. Click the name of the server for which you want to configure the identity and trust keystores.
4. Select **Configuration > Keystores.**
5. In the **Keystores** field, select the method **Custom Identity and Java Standard Trust** for storing and managing private keys/digital certificate pairs and trusted CA certificates.
6. In the **Identity** section, define attributes for the identity keystore.
   - **Custom Identity Keystore:** The fully qualified path to the identity keystore `nms-ssl.keystore`. This will be in the $NMS_HOME/java directory.

     Note: if your WebLogic Server is running on a different server than the NMS installation, nms-ssl.keystore will need to be copied to a location where it is accessible to the account running WebLogic.
   - **Custom Identity Keystore Type:** The type of the keystore. Generally, this attribute is Java KeyStore (JKS); if left blank, it defaults to JKS.

- **Custom Identity Keystore Passphrase:** The password you will enter when reading or writing to the keystore. This attribute is optional or required depending on the type of keystore. All keystores require the passphrase in order to write to the keystore. However, some keystores do not require the passphrase to read from the keystore. WebLogic Server only reads from the keystore so whether or not you define this property depends on the requirements of the keystore.

7. Click **Save.**
8. To activate these changes, in the Administration Console's Change Center, click **Activate Changes.**

Configure SSL

1. If you have not already done so, in the Administration Console's Change Center, click **Lock & Edit.**
2. In the left pane of the Console, expand **Environment** and select **Servers.**
3. Click the name of the server for which you want to configure SSL.
4. Select **Configuration > SSL,** and set the SSL attributes for the Private Key Alias (defaults to nms-key) and Private Key Passphrase.
5. Click **Save.**
6. To activate these changes, in the Administration Console's Change Center, click **Activate Changes.**
7. Stop the Admin server.
8. Edit the WebLogic configuration file (`config/config.xml`):

   In the `<ssl>` section, after the line:

   ```
   <enabled>true</enabled>
   ```

   Add the following lines:

   ```
   <ciphersuite>TLS_RSA_WITH_RC4_128_MD5</ciphersuite>
   <ciphersuite>TLS_RSA_WITH_RC4_128_SHA</ciphersuite>
   <ciphersuite>TLS_RSA_WITH_3DES_EDE_CBC_SHA</ciphersuite>
   <ciphersuite>TLS_RSA_WITH_AES_128_CBC_SHA</ciphersuite>
   ```

9. Save the changes to config.xml.
10. Restart WebLogic Admin server.

Configure the SSL Listen Ports for a Server

1. If you have not already done so, in the Administration Console's Change Center, click **Lock & Edit.**
2. In the Administration Console, expand **Environment** and select **Servers.**
3. On the Servers page, click the name of the server.
4. Select **Configuration > General.**
   - Select SSL Listen Port Enabled so that the server listens on the SSL listen port.
   - If you want to disable the non-SSL listen port so that the server listens only on the SSL listen port, deselect **Listen Port Enabled.**
5. Click **Save.**
6. To activate these changes, in the Administration Console's Change Center, click **Activate Changes.**

Set the Default Authenticator Control Flag

1. If you have not already done so, in the Administration Console's Change Center, click **Lock & Edit.**
2. In the left pane, select **Security Realms,** then click the name of the realm you are configuring. Select myrealm.
3. Select **Providers > Authentication.**

   The Authentication Providers table displays the name of the Authentication and Identity Assertion providers.
4. Click the name of the provider you want to configure. Select DefaultAuthenticator.
5. Select **Configuration > Common** and set the **Control Flag** to OPTIONAL.
6. Click **Save.**
7. To activate these changes, in the Change Center click **Activate Changes.**

Create and Configure an Active Directory Authentication Provider

Note that any of the **WebLogic Authentication Provider** types can be used. Here, ActiveDirectoryAuthenticator is used as an example.

1. If you have not already done so, in the Administration Console's Change Center, **click Lock & Edit.**
2. In the left pane, select **Security Realms** and click the name of the realm you are configuring (defaults to myrealm).
3. Select **Providers > Authentication** and click **New.**

   The Create a New Authentication Provider page appears.
4. In the **Name** field, enter a name for the Authentication provider. For example, enter ldap-provider.
5. From the **Type** drop-down list, select the type of the Authentication provider and click **OK**. Select ActiveDirectoryAuthenticator.
6. Select **Providers > Authentication** and click the name of the new Authentication provider to complete its configuration.
7. Select **Configuration > Common** and set the **Control Flag** to OPTIONAL.
8. Click **Save.**
9. Select **Configuration > Provider Specific** and set the desired values for your Active Directory server. The following configuration is given for example purposes only.

   For Connection:

   Host: server.example.com

   Port: 389

   Principal: cn=Administrator,cn=Users,dc=example,dc=com

   Credential: The credential (usually a password) used to connect to the LDAP server.

   For Users:

   User Base DN: cn=Users,dc=example,dc=com

   User Name Attribute: Ensure this matches the attribute specified in the User Base DN (e.g. "cn").
10. Click **Save**.
11. To activate these changes, in the Change Center, click **Activate Changes**.

12. After you finish configuring Authentication providers, restart WebLogic Server.

    IMPORTANT: verify that users and groups from your authenticator are configured by looking at the **Users and Groups** tab for your security realm.

Copy Supporting Files from the NMS Distribution to the WebLogic Domain

Certain files are required to be installed into the domain level of the WebLogic server. Since WebLogic installations vary, it is necessary to manually copy these files to your WebLogic domain.

As you use the instructions below to copy the files, substitute your system's appropriate values for each of:

- `$CES_HOME`
- `WLS_HOME`
- `domain_name`
- `user`
- `hostname`

Alternative 1 - If the WebLogic Server is located on the **same** system as the NMS installation.

1. Copy the contents of the `wls` directory recursively using **`cp`**:

   ```
   cp -L -r $CES_HOME/dist/install/wls/. $WLS_HOME/user_projects/
   domains/domain_name
   ```

Alternative 2 - If the WebLogic Server is located on a **different** system than the NMS installation.

1. Copy the contents of the `wls` directory recursively using **`scp`**:

   ```
   $ scp -r user@hostname:$CES_HOME/dist/install/wls/. WLS_HOME/
     Oracle/Middleware/user_projects/domains/domain_name
   ```

2. Having copied the files, restart the WebLogic Managed Server that will be running NMS.

Configure Log4j Logging Services

1. Edit the **`setDomainEnv.sh`** script, which is located in the `WLS_HOME/Oracle/Middleware/user_projects/domains/`*`domain_name`*`/bin` directory:

   Find the line that begins:

   ```
   if [ "${LOG4J_CONFIG_FILE}" != "" ]
   ```

   and insert the following lines above it:

   ```
   LOG4J_CONFIG_FILE=${DOMAIN_HOME}/nms-log4j.xml
   export LOG4J_CONFIG_FILE
   ```

The nms-log4j.xml file controls Oracle Utilities Network Management System logging. It may be modified as necessary.

Deploying Oracle Utilities Network Management System in WebLogic Server

To deploy the Oracle Utilities Network Management System application in your domain, follow these steps:

1. Login in as the user account that will run the WebLogic Application Server.
2. Access the WebLogic Server Administration Console by entering the following URL:

   `http://hostname:port/console`

   Here *hostname* represents the DNS name or IP address of the Administration Server, and *port* represents the number of the port on which the Administration Server is listening for requests (port 7001 by default).
3. If you have not already done so, in the Administration Console's Change Center, click **Lock & Edit**.
4. In the left pane of the Administration Console, select **Deployments**.
5. If there is a deployment from a previous installation, complete the following two actions before proceeding to step 6:
   - Select the checkbox to the far left of the deployed cesejb application. Click **Stop** and choose **Force Stop Now** to stop the application.
   - Select the checkbox to the left of the deployed cesejb application. Click **Delete** (located at the top or bottom of the Deployments table), to delete the cesejb application. Click **Yes** to confirm your decision.
6. In the right pane, click **Install**.
7. In the Install Application Assistant, locate the `cesejb.ear` to install. This will be in the `$NMS_HOME/java/deploy` directory.
8. Click Next.
9. Specify that you want to target the installation as an application.
10. Click **Next**.
11. Select the servers and/or cluster to which you want to deploy the application. The cesejb.ear should be deployed to its own managed server or cluster; therefore, either select a managed server/cluster that does not have other applications or interfaces deployed to it or move existing deployments to a separate instance.

    Note: If you have not created additional Managed Servers or clusters, you will not see this assistant page.
12. Click **Next**.
13. Update the following additional deployment setting:
    - Change the deployed name of the application from `cesejb` to something unique.
14. Click **Next**.
15. Review the configuration settings you have specified, and click **Finish** to complete the installation.
16. If you chose to immediately go to the deployment's configuration screen, click the tabs to set additional configuration settings for the application or module.

    If you chose to change this information later, you are returned to the **Deployments** table, which now includes your newly-installed application or module.
17. To activate these changes, in the Administration Console's Change Center, click **Activate Changes**.

18. A restart of the WebLogic managed server(s) that will be running Oracle Utilities Network Management System is not required for these changes to take effect unless you are instructed to do so at this time.

19. Open a browser and navigate to: http://hostname:port/nms

    Here *hostname* represents the DNS name or IP address, and *port* represents the port for the WebLogic Server.

Troubleshooting

If there are deployment issues and you want to validate the connection to the CORBA gateway, open the WebLogic log file, which will display diagnostic information including any issues with the database and CORBA gateway configuration.

Installing Oracle Utilities Network Management System Web Clients

The Oracle Utilities Network Management System Web Clients may be run from a browser as a Java Web Start application or by installing individual Java client applications.

Java Web Start

If the Java Web Start version is chosen, there is no client installer needed. The user opens the NMS application landing page and clicks a link to one of the Java applications, such as Web Workspace.

Example

URL: `https://<web-gateway>/nms/`

Web Workspace Java Web Start link:

```
https://<web-gateway>/nms/nmswebstart?appName=WebSwitching.jnlp
```

Java Client Installation

The Java client applications installer is created by the Oracle Utilities Network Management System Configuration Assistant, which is also a Java application. Therefore, to create the installer, the Configuration Assistant must be run (at least once) using Java Web Start.

Install Prerequisite Software

The client installer creation process requires the following applications be pre-installed on the PC that will run the Configuration Assistant.

- **NSIS** (Nullsoft Scriptable Install System), version 2.46, is an open-source Windows installer development tool; project on SourceForge (http://sourceforge.net/projects/nsis/).
- **Launch4j**, version 3.0.2, is a tool that wraps Java applications in a Windows executable file; available on SourceForge (http://launch4j.sourceforge.net/).
- **Java Standard Edition JDK**. This should match the version you wish to include as part of the client installation. Normally you would choose the latest 1.7 JDK. (http://www.oracle.com/technetwork/java/javase/downloads/index.html)

Create Environment Variables

1. Create the following system environment variables, as necessary, to ensure that the Configuration Assistant can find the applications.

   - **NSIS Environment Variable**

     Name: **`NSIS_HOME`**

     Value: Path to NSIS.exe.

     Note: If NSIS was installed in the default location, the environment variable does not need to be added.

- **Launch4j Environment Variable**

  Name: **LAUNCH4J_HOME**

  Value: Path to launch4j.exe.

  Note: If Launch4J was installed in the default location, the environment variable does not need to be added.

- **JDK Environment Variable**

  Name: **JAVA_HOME**

  Value: Path to the root of the JDK (where the jre and bin subfolders are located).

2. After setting the environment variables, reboot your PC.

Create Installer

To create the installer, open Configuration Assistant and do the following:

1. Select **Create Client Installer...** from the **Actions** menu.

   A save dialog will open that allows you to modify the file name and location; neither the name nor location will affect how the applications are ultimately installed.

2. Click **Save**.

   Note: if the file already exists at that location, you will be asked to confirm replacement.

3. The client installer creation process will call NSIS, which will open and display a log of its activities in the **MakeNSISW** window. When the process is complete, NSIS will allow you to run the installer (using the **Test Installer** function) or **Close** the application.

Install Client Applications

1. If **MakeNSISW** is still open, click **Test Installer** to run the client installer. If it is not open, navigate to the location where the installer was saved and double-click the installer file name or icon (depending on your view). The **Oracle Utilities NMS Setup Wizard** dialog will open.
2. On the **Choose Install Location** page, select the destination folder and click **Next**.
3. On the **Choose Components** page, select the components to install from the list of licensed products. Click **Install**.
4. When the installation is complete, click **Close**.

Application shortcuts will be available from the **Start Menu** under **All Programs > Oracle Utilities NMS**.

Updating Clients

Client installers must be recreated whenever a new release (major release, service pack, or patch) is implemented.

1. Uninstall the existing applications from each client PC.
2. Follow the “Create Installer” task using the updated Configuration Assistant.
3. Follow the “Install Client Applications” task.

Installing html2ps

The perl script html2ps is used to convert HTML formatted documents or output to a PostScript style format so that the document can be sent directly to a PostScript printer.

The installation of this script is required if you are implementing the **Oracle Utilities Network Management System Service Alert** application with printing. Service Alert is able to send out notifications to pagers and emails without this script. The script is only required for printed notifications.

Currently, the html2ps script can be found at http://user.it.uu.se/~jan/html2ps.html. This script requires version 5 of Perl.

Follow these steps to install the script:

1. Download the compressed tarfile to your Unix server.
2. Move the file to an appropriate location for untarring.

```
gunzip < html2ps-1.0b5.tar.gz | tar xv
su root
cd html2ps-1.0b5
./install
```

   Note: Make sure you put "./" in front of "install".

3. You will be asked if you want to proceed with the installation. Confirm the default value by selecting **Enter**.
4. You will be asked to specify a command for retrieving remote documents. Confirm the default value by selecting **Enter**.
5. You will be asked to install in the subdirectories *bin*, *lib*, and *man*. Confirm the default value by selecting **Enter**.
6. When asked to enter a directory, enter: `/usr/local/bin`
7. You will be asked to enter the default paper type. A4 is the default size. U.S. users will probably want to change this to letter or legal. If A4 is acceptable, select **Enter**.
8. The html2ps script and manpages will be installed.

Installing BI Publisher for Web Switching

For instructions on installing and configuring Web Switching BI Publisher reports, refer to the "Web Switching Configuration" chapter of the *Oracle Utilities Network Management System Configuration Guide*.

Installation, Project Configuration, and Runtime Directory Structure

The Oracle Utilities Network Management System has three directory areas involved with product installation, project configuration, and runtime. This section describes how these directories are created and interact.

Oracle Utilities Network Management System Directory Overview

The Oracle Utilities Network Management System Directory structure is comprised of three major areas:

- The Oracle Utilities Network Management System Installation directory
- The Oracle Utilities Network Management System Project Configuration directory
- The Oracle Utilities Network Management System Runtime directory

Oracle Utilities Network Management System Installation Directory

The Oracle Utilities Network Management System Installation directory is created as part of the installation process. There are two environment variables involved with this directory:

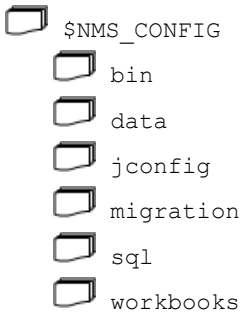
- **$NMS_ROOT** – Points to the top-level of the Oracle Utilities Network Management System installation directory and is typically set to "NMS". The installation process will create a directory under the $NMS_ROOT called "product". Under "product" will be the directories for each version of the Oracle Utilities Network Management System installed named by the fully qualified release number (i.e., `$NMS_ROOT/nms/product/`1.12.0.1).
- **$CES_HOME** – Points to the current product version being utilized by the running system. For example: `$CES_HOME=$NMS_ROOT/nms/product/`1.12.0.1

The installation directory will contain all content from the Oracle E-Delivery and should not be changed by the runtime system or user.

Oracle Utilities Network Management System Project Configuration Directory

The Oracle Utilities Network Management System Project directory will contain all project-specific configurations, scripts, and programs required to run the Oracle Utilities Network Management System. This directory is identified by the environment variable: $NMS_CONFIG and is typically set to "$NMS_HOME/config". Configuration files in the configuration directory will need to be prefixed by the project name. For example, the project classes file will have the path: `$NMS_CONFIG/sql/config_classes.dat`.

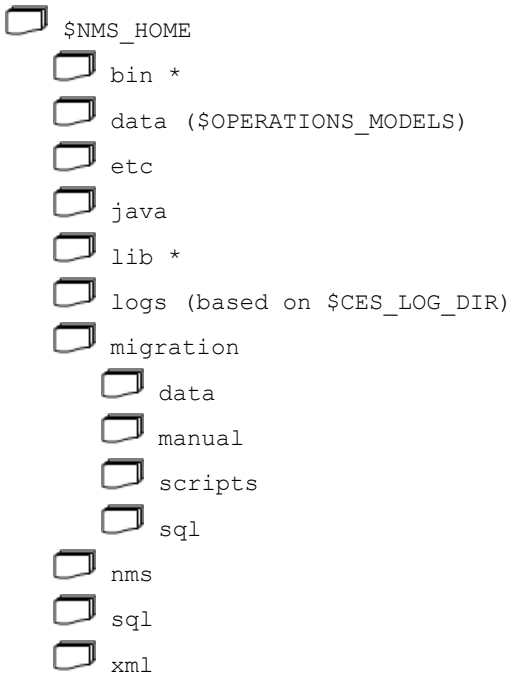
Here is the top level directory structure for the project configuration directory



Other files and directories can exist in the $NMS_CONFIG directory, but only those documented above will be utilized by the install script: nms-install-config.

Oracle Utilities Network Management System Runtime Directory

The Oracle Utilities Network Management System runtime directory will contain all runtime specific configurations, scripts, and programs required to run the Oracle Utilities Network Management System. This directory is identified by the environment variable: $NMS_HOME and for Oracle Utilities Network Management System Release 1.12.0.1 this must be set to $HOME (*i.e.*, `/users/nmsadmin`).



* The bin and lib directories have historically contained the Oracle Utilities Network Management System executables and shared libraries. This is no longer true (as of Oracle Utilities Network Management System v1.9.0.1). These executables and shared libraries now exist in `$CES_HOME/bin` and `$CES_HOME/lib`.

Oracle Utilities Network Management System Directory Administration

The install process establishes the Oracle Utilities Network Management System Installation Directory. The project implementation team creates the contents of the Oracle Utilities Network Management System Project Directory. The nms-install-config script installs the product and project configurations into the runtime directories. Project files will either be appended to or override the product configurations based on type.

Oracle Utilities Network Management System WebLogic Administrative Actions

There are a few administrative functions that are accessed through a specially configured Java Monitoring & Management Console.

Accessing the Java Monitoring & Management Console

To access the console:

1. Open a browser and navigate to: http//hostname:port/nms/console.jnlp
2. Enter the WebLogic administrative username and password.

Reloading a Managed Server

1. Click the **MBeans** tab.
2. In the tree pane, expand **NMS**, **CorbaPublisher.**, and **Operations**.
3. In the tree pane, select **action**.
4. In the field under **Operation invocation**, enter `refresh` and then click **action**.

   Note: this action is the same as the command line utility:

   ```
   Action any.pub* ejb refresh
   ```

Other Available Operation Invocations

The following options require no parameters. Select **Operations** and then click the buttons in the Operation Invocation panel, as necessary.

Operation	Description
preprocessMaps	This will ensure that all viewer maps are converted to .ser files. This is generally not necessary since the system will convert maps on demand.
prefetchElectricalMaps	This will load all electrical maps and their status into the managed server. Normally maps are loaded the first time they are accessed.
testGatewayConfiguration	This can test the CORBA gateway configuration of a running system.
mapCacheSize	This shows statistics on the maps that are currently loaded in memory.

Configuring a Web Call Entry-Only Managed Server

The managed server for Web Call Entry can be configured to not require access to the corbagateway or publisher. (Only the database).

Set the managed server up normally with the following changes:

1. Add `-DcorbaInitRef=NONE` to the managed server startup parameters (See **Configure the Arguments to Use When Starting a Server in Your Domain** on page 3-21.)
2. Change license.properties to have only LicensedProduct=WebCallentry
3. Create overrides for Web Call configuration files by copying the following files from `$CES_HOME/dist/baseconfig/product/ops/callentry/xml/`:
   - CALLENTRY_MENUBAR.inc
   - DLG_SAVE_FUZZY.xml
   - DLG_SAVE_UNCONNECTED.xml

   to $NMS_CONFIG/jconfig/ops/callentry/xml.
4. Edit the new CALLENTRY_MENUBAR.inc by replacing:

```
<Enabled initial="false" when="SAVEABLE or (FUZZY_CALL and
TXTF_ADDRESS_POPULATED) or INTERSECTION_POPULATED"/>
  <PressPerform>
<Command value="ValidateCallDataCommand"/>
    <Command value="SaveCommand"/>
```

   with this:

```
<Enabled initial="false" when="SAVEABLE or (FUZZY_CALL and
TXTF_ADDRESS_POPULATED) or INTERSECTION_POPULATED"/>
  <PressPerform>
<Command value="ValidateCallDataCommand"/>

<Command value="SaveCommand">
   <Config name="connection" value="database"/>
</Command>
```

5. Edit DLG_SAVE_FUZZY.xml by changing

```
<Enabled initial="false" when="FUZZY_CALL and
TXTF_ADDRESS_POPULATED"/>
  <PressPerform>
   <Command value="SaveCommand"/>
```

   to this:

```
<Enabled initial="false" when="FUZZY_CALL and
TXTF_ADDRESS_POPULATED"/>
  <PressPerform>
   <Command value="SaveCommand">
      <Config name="connection" value="database"/>
   </Command>
```

6. Edit DLG_SAVE_UNCONNECTED.xml by changing

```
<ButtonBehavior>
  <Enabled initial="false" when="FUZZY_CALL and
   TXTF_ADDRESS_POPULATED"/>
  <PressPerform>
   <Command value="SaveCommand"/>
```

to this:

```
<ButtonBehavior>
  <Enabled initial="false" when="FUZZY_CALL and
   TXTF_ADDRESS_POPULATED"/>
  <PressPerform>
   <Command value="SaveCommand">
      <Config name="connection" value="database"/>
   </Command>
```

A limitation of running this way is that the managed server will not pick up new control zones that are used for populating fuzzy calls. If a control zone change is done that would affect that function, an administrator would have to run a refresh action on that managed server (See **Oracle Utilities Network Management System WebLogic Administrative Actions** on page 3-32.)

Troubleshooting Oracle Utilities Network Management System

Please refer to the "Troubleshooting" chapter of the *Oracle Utilities Network Management System Configuration Guide* for information on typical debugging strategies for various aspects of the system as well as locations of log files that contain pertinent information about the runtime applications.

Appendix A

Updating Configuration and Performing Migrations for a New Release

This appendix defines the steps required to configure and migrate a system to a new release. It is a combination of manual processes and automated scripts. After installing the new version of Oracle Utilities Network Management System, you will first need to apply the required configuration changes. Once that has been done, you need to use ces_setup to run the new migrations. This appendix documents those two processes.

- **Updating Configuration for a New Release**
- **Applying Migrations**

Updating Configuration for a New Release

Prerequisites

A Subversion client, such as TortoiseSVN for Microsoft Windows (recommended), should be installed on a Windows machine to be used for updating and migrating the project configuration. We require Subversion 1.7 or higher with command line tools.

Note: the examples in this Appendix use TortoiseSVN.

The merging environment uses the same structure as a configuration environment, which is documented in the "Testing the Java Client Configuration" section of the "Java Application Configuration" chapter of the *Oracle Utilities Network Management System Configuration Guide*.

If you are merging on a Microsoft Windows-based PC that is not set up for configuration changes, do the following:

1. Install Apache Ant version 1.8.2. Be sure to put the ant bin directory on the system path. For example, if Apache Ant is installed to `C:\apache-ant-1.8.2`, add `C:\apache-ant-1.8.2\bin` to the system path.
2. Create local directories by running these commands from a Microsoft Windows command prompt:

```
> mkdir C:\OracleNMS
> mkdir C:\OracleNMS\<your_project_name>
```

3. Create the following environment variables in the Microsoft Windows Control Panel:

   - **NMS_CONFIG Environment Variable**

     Name: `NMS_CONFIG`

     Value: `C:\OracleNMS\<your_project_name>`

   - **NMS_HOME Environment Variable**

     Name: `NMS_HOME`

     Value: `C:\OracleNMS`

Updating the Java Configuration to a New Oracle Utilities Network Management System Version

Note: If you have previously set up SVN to handle configuration changes and are moving from a different version or service pack, it is important to start with the existing SVN database from your starting service pack. If you are doing this on a different computer and, thefore, do not have your previous SVN database, do the following steps on your existing system before updating to the new version. However, if you are going to a different patch bundle on the same release, this is not necessary.

On the NMS server, do the following:

```
$ ant -f $CES_HOME/dist/install/build.xml sanitize unpack_ears
```

If this is the first time you have done this process, run the following to copy missing product files to your project configuration:

```
$ cd $NMS_CONFIG/jconfig
$ ant combine_config
```

In all cases, run the following:

```
$ cd $NMS_CONFIG
$ zip -r $NMS_HOME/nms_config.zip jconfig
$ cd $NMS_HOME
$ zip -r $NMS_HOME/java.zip java
```

Next, transfer those zip files to the client machine and unzip them:

- Unzip nms_config.zip to c:\OracleNMS\<*your_project_name*>
- Unzip java.zip to c:\OracleNMS\

From a Microsoft Windows command prompt:

```
> cd %NMS_CONFIG%\jconfig
> ant svn
```

Merging Changes

There are three approaches that can be used when updating configuration:

- **Merging the new product changes to the project's configuration.**

  ```
  > ant merge_product_changes
  ```

  This will apply the differences between the previous version of the product with the new version, and apply the changes as local modifications to the project's configuration. This works well for patch bundles and service packs.

- **Merging project changes to a product configuration.**

  When upgrading to a new major release, it may be simpler to start with the new product version, then apply the differences between the project configuration and the old product configuration. This can be a simpler merge if there have been extensive product changes, especially if the project changes are relatively limited. This is done by the following:

  ```
  > ant merge_project_changes
  ```

- **Replacing project changes with product configuration.**

  This option compares the current project configuration with the current product configuration. The SVN diff tool will show the changes necessary to change the project configuration to product. If this option is used, you should revert the changes that you don't want before committing the changes. This is helpful when it is not possible to use the previous product as a base line, or if it is desirable to audit the differences between project and product. This is done by:

  ```
  > ant replace_with_product
  ```

Validating Configuration Changes

Using Windows Explorer, right click the `$NMS_CONFIG/jconfig` directory, then select **TortoiseSVN** and then **Check for modifications**. The Check for Modifications window lists the files in the directory and whether there are differences in the folder contents or in the individual files.

If you wish to see the changes in a file, right-click a changed file and choose **Compare with base** to open the TortoiseMerge tool. It will show you the files side-by-side with differences highlighted and allow you to modify or reject the changes.

If there are conflicts, open the TortoiseSVN **Edit Conflicts** dialog, which will show the changes that were made by the project (under **Mine**), and the product changes (under **Theirs**). You can use this tool to resolve conflicts.

If you need to see the history for a file, you can bring up the SVN repository browser and right-click the name of the file and select **Show log**. To see the specific changes for a bug, right-click and select Compare with previous revision, which will bring up TortoiseMerge with differences between revisions highlighted.

After validating the configuration changes, and resolving any conflicts, test the configuration in the configuration environment to make sure everything is working correctly.

Committing the Changes

Once you've verified the changes, commit them by selecting **SVN Commit...**. In the Commit dialog, enter a description of the revision in the text box and then click **OK**

Finally, transfer the files in C:\OracleNMS\<your_project_name>\jconfig to the NMS server directory $NMS_CONFIG/jconfig.

Integrating with an Existing SVN Repository

Normally, the system uses a repository that is stored on the local system, in `$NMS_HOME\OracleNMS\svn`.

To use a different repository, define the location of the repository and paths in build.properties. For example:

```
# The location of the repository.
# If this is not defined it will the repository located in file:///
$NMS_HOME/svn
repository_location = https://svnserver.mycompany.com/svn/trunk/
nms

# The path from the root of the repository to where the product
revisions should be
# stored. This defaults to "product"
svn.product.path = product

# The path from the root of the repository to where the project
revisions should be
# stored. This defaults to "project"
svn.project.path = project
```

Applying Migrations

Disabling System Logins

When patches are applied to the system, it is important for all users to be out of the system. This can be accomplished with the following Action command from the user that is running the nms services:

```
Action any.pub* ejb enable_login false
```

This will force all users to log out and keep them from logging back in. After the system is updated, and you wish to restore logins, run this command:

```
Action any.pub* ejb enable_login true
```

Applying Product Migrations

The Apply Product Migrations process migrates the model of an older Oracle Utilities Network Management System release to that of a new software version. Based on a release level identifier, the migration process determines the differences between the current model and that of a new release. After the installation of a new release of software, and the loading of a copy of your existing production database, you will need to do the following:

- Execute the `$CES_HOME/bin/ces_setup.ces` script.

This script will call another script called `ces_apply_migrations.ces`, which determines the differences between the release level of the software and the model database. This script then determines the required and optional migrations by accounting for differences in the release database requirements.

Manual Product Migrations

If a manual migration is required, the `ces_setup.ces` script will stop at that point and alert the user of the required manual migration. When this occurs, please see the corresponding manual migration file in the `$NMS_HOME/migration/manual` directory for details on what is required

for this migration. The files in this directory are named <####>.txt, where <####> is the bug or problem report (PR) number.

The $NMS_CONFIG/migration/data/<project>_config_ready.dat file serves as a "sign-off" document for the Oracle Utilities Network Management System project team. As you determine that a manual migration has been completed (or is not needed for your system), you must add the corresponding bug numbers to the $NMS_CONFIG/migration/data/<project>_config_ready.dat file by entering one bug number per line. Once you have edited this file, you can run $CES_HOME/bin/nms-install-config to copy it to the $NMS_HOME/migration/data directory or manually copy the file there if you prefer. This signals the migration script that this particular manual migration has been completed. Once the file has been properly copied to $NMS_HOME/migration/data, you need to rerun the ces_setup.ces script. Continue this process until all manual and automated migrations are executed.

Please note that if the **Updating Configuration for a New Release** process was followed, the configuration changes that are in $NMS_CONFIG/jconfig will have already been updated. While these changes are listed as requiring manual migrations, they just need to be added to the <project>_config_ready.dat. It is expected that in the future the manual migrations will include only those configuration changes needed to configure a new feature or option.

> **Note:** The bug numbers indicated in the manual migration may not be listed in the Product Fix Document (PFD) supplied with the release. The migrations always refer to an original bug, which is associated with a particular release; any other releases that receive the fix will have a separate bug number (*i.e.*, a "copy-bug"). When resolving manual migration issues, always refer back to the text files placed in the $NMS_HOME/migration/manual directory and not the PFD document associated to that bug fix.

Command Line Options

The ces_apply_migrations.ces script can be initiated directly from the command line in order to view some of the things that it will be doing when started from the ces_setup.ces script. The following table describes all of the command line options for this script.

Option	Description
-debug	Displays debug information.
-showme	List all processes that would be executed, but do not actually execute any programs or SQL files.
-needConfig	Displays a list of migrations that are required by a project.
-listMigrations	Displays a list of migrations needed without applying them.

> **Note**: The ces_apply_migrations script should not be run without any command-line arguments since that would cause the migrations to actually be executed. The command-line arguments listed above are to be used with the script so that it can be run in a "show only" mode but won't actually do the migrations.

Installing Product Migration Files

The data files that are required for the migration process are installed in the $NMS_HOME/migration/data directory. After making changes to the project-specific $NMS_CONFIG/migration/data/<project>_config_ready.dat file and an optional special $NMS_CONFIG/migration/data/<project>_migration.dat file, run

nms-install-config script to install them into the $NMS_HOME/migration/data directory.

The Product Migration Process

The ces_apply_migrations.ces script determines the database differences by comparing the database release level in the CES_PARAMETERS table with the software release levels found in the software_release_id.dat and software_release_levels.dat files. Based on these differences, it will create a list containing all of the necessary migrations.

The migration process, or ces_apply_migrations.ces, finds the necessary migrations in the $NMS_HOME/migration/data/pr_migration.dat file and the $NMS_HOME/migration/data/product_pr_migration.dat file, which contains the list of PRs, releases, patch levels, and configuration types. If there are project-specific migrations, then a optional <project>_pr_migration.dat file is also used.

The pr_migration.dat files resemble the following example:

PR	Release	Patch	Required	Config Required	Script Exists	ConfigType
----	-------	-----	--------	------	------	----------
19254	5.5	3	Y	Y	Y	config_sql
19831	6.0	3	Y	N	Y	schema_sql

The following table describes the pr_migration.dat file columns.

Column	Description
PR	Bug number for the migration.
Release	Migration release level, two numbers not including the first digit. For example, release 1.8.1 would be just 8.1 in this field.
Patch	Migration patch level. If the release if 1.8.1.2, then the Patch would be 2.
Required	Whether or not this migration is required for the system to function properly. If set to Y, all projects would be forced to execute this migration when encountered. A value of N means that the migration is optional, and it would be skipped for any projects that do not list it within their <proj>_config_ready.dat file.
Config Required	Whether or not configuration is required by a project for the system to function properly. This value is set to Y whenever a change is made that requires configuration work. For instance, if a new required column is added to a configuration table, the population of this new column properly is the domain of the project engineer, not the developer. Setting this field to Y will flag to all project engineers that this migration requires their attention before the migration can be executed. The specific instructions for configuration migration will be documented in the bug's Migration section; the manual migration text file located in $NMS_HOME/migration/manual. Project engineers signify that the configuration has been examined and completed by adding this migration bug to the <proj>_config_ready.dat file.

Column	Description
Script Exists	Indicates whether a script exists for the migration. For example, if a script exists for bug 19254, then there is a script pr19254_migration.ces that performs the migration. Not all migrations involve explicit scripts. As an example, a configuration table change would normally not require a migration. However, if it is important that a new configuration column be properly populated, this must be flagged for project engineers. This is done by adding the bug to pr_migration.dat, setting Config Required to Y and Script Exists to N. Even though there is no migration script, the migration process will not proceed until the project engineer has signified that the configuration is complete by adding the bug to the <proj>_config_ready.dat file.
Config Type	Describes the type of configuration change. Valid values are: • config_sql - A configuration SQL file has changed. • schema_sql - A schema SQL file has changed. • retain_sql - A retain SQL file has changed. • core_sql - A core (required) data SQL file has changed. • data - Model (facilities) data is being migrated. • app_defaults - New or obsolete application default options. • map_rebuild - The migration script will regenerate map files. • metafile_rebuild - The script will regenerate all map metafiles. • service_restart - Services must be restarted. • environment_restart - All user environments must be restarted.

Correcting Warnings and Errors

The table below shows the corrections for some possible errors you might receive when running the ces_apply_migrations.ces script.

Warning	Remedy
WARNING THE FOLLOWING MIGRATIONS NEED CONFIGURATION PR_NUMBER RELEASE_PATCH	This warning is displayed when migrations requiring manual changes are found. To determine the necessary changes, refer to the corresponding file in the $NMS_HOME/migration/manual directory. After making the manual changes, add the PR number to the $NMS_CONFIG/migration/ <project>_config_ready.dat file.

Warning	Remedy
DATABASE RELEASE LEVEL IS GREATER THAN SOURCE RELEASE LEVEL MIGRATING BACKWARDS NOT SUPPORTED	This error indicates that the schema level of the database is greater than the runtime executables that are being used. You can return to a prior release if you execute the ces_setup.ces script with the -clean command line option and perform a model build. You should not return to a prior release without running a ces_setup.ces -clean and a model build, for there may be unresolved problems that could cause system instability.

Applying Custom Migrations for Oracle Utilities Network Management System Integrators

The custom migration process allows you to apply custom migrations to the database.

Process Overview

- Custom migrations are entered in an XML file (`utility_migrations.xml`) that is saved to `$NMS_CONFIG`.
- Migrations are applied by running `ces_setup.ces` or when you run `ces_apply_migrations.ces` manually.
- `ces_setup.ces` and `ces_apply_migrations.ces` call a script (`utility-apply-migrations.sh`) that launches `utility-migrations.jar`, which creates or updates the `UTILITY_MIGRATIONS` database table and then applies the migrations.

Adding Custom Migrations to the Utility Migrations XML File

The utility_migrations.xml file, which is based on the utility_migrations.xsd schema (found in $CES_HOME/xml/), has the following structure:

```
<utility_migration>
    <migration>
        <base_name>migration1</base_name>
        <before>...</before>
    </migration>
    <migration>
        <base_name>migration2</base_name>
        <before>...</before>
    </migration>
    .
    .
    .
</utility_migration>
```

- The **<base_name>** element contains the name of the migration file without any suffix. The migration files are either *.ces scripts or *.sql files found in `$NMS_HOME/migration/`.
- Any number of <migration> elements may be included in utility_migrations.xml.
- The **<before>** element must have one of the following values:

Value	Description
T	True, if the migration is to be run before product migrations.
F	False, if the migration is to be run after product migrations.

Running the Migration Scripts

ces_setup.ces and ces_apply_migrations.ces run a utility migration script that checks for the existence of the utility_migration.xml file. When the utility_migrations.xml file is read, the migration information is used to update the `UTILITY_MIGRATIONS` database table.

All migrations added to the table must actually exist or an error is generated. For any given <base_name> element, the migration system first looks in `$NMS_HOME/migrations/scripts` for a `.ces` script with the given base_name found in the xml file. If such a base_name script is found, it will be run when ces_setup.ces is run. Otherwise, the application will look in `$NMS_HOME/migrations/sql` for a `.sql` file with the base_name given in the xml file. If a migration is not found in either directory, an error is generated. All .ces scripts must be executable or the migration will fail to run.

UTILITY_MIGRATIONS Database Table

The migrations found in the `$NMS_CONFIG/utility_migrations.xml` file are stored in the UTILITY_MIGRATIONS database table, which is defined by the following:

```
create table utility_migrations (
             stamp TIMESTAMP not null,
             base_name VARCHAR2(32) unique not null,
             before VARCHAR2(1) not null,
             applied VARCHAR2(1) not null,
             status VARCHAR2(32) not null)
```

where

- The **`stamp`** column is an Oracle TIMESTAMP datatype representing the time when the migration was added to the table. The base_name column should contain the simple file name of the migration without any suffix. The utility-apply-migrations.sh script will look for this sql file in $NMS_HOME/migration/sql. It will also look in $NMS_HOME/migration/scripts for filename.ces, if it exists. If a script exists, it will be executed. Otherwise, the sql file is run in instead.
- The **`before`** column is set to "T" if a migration is to be applied before product migrations and to "F" if it is to be applied after product migrations.
- The **`status`** column will contain the most recent status for a migration. This will usually will be *Inserted*, *Applied*, or *Failed*.
- The **`applied`** column is "T" if the migration has been applied to the database. If the applied column is "F", the migration has not yet been applied to the database.

  Note: once a migration has been applied to the database, that migration can no longer be changed in the database.

Appendix B

Third Party Software

This appendix provides licensing and copyright information associated with the open source third party products installed with the Oracle Utilities Network Management System.

- **ACE / TAO 2.2.0**
- **Apache Packages**
- **boost-1.45.1**
- **csmap-1922**
- **gsoap-2.7.16**
- **Jena 2.6.4**
- **Jython 2.7**
- **PCRE 8.35**
- **lighttpd 1.4.33**

ACE / TAO 2.2.0

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boost-1.45.1

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PCRE 8.35

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THE BASIC LIBRARY FUNCTIONS

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End

lighttpd 1.4.33

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