

Verax NMS Installation Guide for UNIX and Windows

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TABLE OF CONTENTS

How to use this guide?	6
Purpose and scope.....	6
Notation used.....	6
Intended audience and guide overview.....	7
1 System requirements.....	8
1.1 Hardware and operating system requirements	8
1.1.1 Server side requirements.....	9
1.1.2 Client workstations.....	9
1.1.3 Network.....	9
1.1.4 GSM modem.....	10
1.1.5 Java	10
1.2 Database system.....	11
1.2.1 Configuring NMS to work with MySQL	11
2 System installation.....	13
2.1 Configuring operating system to work with NMS	13
2.1.1 Limits of open file descriptors	13
2.2 Differences between Standard and Express versions	13
2.3 Installation types.....	13
2.4 Installation logins and passwords.....	14
2.5 Windows installer.....	14
2.5.1 NMS and Core Services Application Server service and Tray Monitor	18
2.6 Archive based installation.....	20
2.6.1 Prerequisites	20
2.6.2 Starting the installation	20
2.6.3 Validating the installation	21

2.6.4	Managing runlevels	22
2.7	First login	24
2.8	Upgrades	25
2.9	Third party management library installation	25
3	System configuration.....	26
3.1	Starting, stopping and restarting NMS	26
3.2	Configuration file directory.....	27
3.3	Changing database settings.....	29
3.4	Changing the Java Runtime Environment used	29
3.4.1	UNIX	29
3.4.2	Windows	29
3.5	Changing JRE parameters	30
3.5.1	UNIX	30
3.5.2	Windows	31
3.6	Creating and configuring a standalone NMS database.....	32
3.6.1	Oracle	32
3.6.2	MySQL	39
4	Backup.....	48
4.1	Backing up configuration files.....	48
4.2	Database backup.....	48
4.2.1	Backing up MySQL database	48
4.2.2	Restoring MySQL Database	49
4.2.3	Oracle data backup.....	49
4.2.4	Restoring Oracle database	50
5	Sanity check	52
5.1	Server check.....	52

- 5.2 Oracle database check.....55
- 5.3 Application server check.....57
- 6 Troubleshooting58**
- 6.1 Invalid license58
 - 6.1.1 Generating license request.....59
 - 6.1.2 Installing a license file59
- 6.2 The NMS server responds but does not show anything60
- 6.3 The NMS server does not respond61
- Index62**

How to use this guide?

This installation guide contains a description of the installation procedure for Verax NMS, a highly scalable, integrated IT service assurance solution for cross-silos management & monitoring of networks, data centers and applications.

Verax NMS reduces costs of IT service delivery, shortens downtimes and increases customer satisfaction levels through streamlining processes of business service management, problem detection and incident resolution.

Purpose and scope

The installation guide contains installation and configuration steps required only to **bootstrap** the system. Detailed configuration and fine-tuning instructions are provided in the on-line help.

Notation used

Source code, commands, user-entered data, on-screen messages and user interface elements (menus, choice lists, etc.) are shown using the Courier font. In order to improve readability indentation has been used, for instance:

```
ls -al
```

! This notation (Information) is used to indicate important information.

⚠ This notation (Warning) is used to flag actions that can lead to data loss, system malfunction, etc.

ℹ This notation (Hint) is used to indicate additional information.

Logotypes are used to flag information relevant to a particular operating system:



Intended audience and guide overview

This installation guide is intended for system administrators or other IT personnel responsible for the NMS installation.

The guide consists of the following chapters:

- **Chapter 1, System requirements** describes hardware and software requirements required to run NMS, both on the server and client sides. It also contains information on system sizing.
- **Chapter 2, System installation** describes NMS installation procedure from installing prerequisites to the first run.
- **Chapter 3, System configuration** describes advanced, post installation configuration options such as switching the database, changing JRE (Java Runtime Environment) or its parameters, database fine-tuning and others.
- **Chapter 4, Backup** describes procedures for backing up NMS database and configuration files.
- **Chapter 5, Sanity check** describes the procedure for conducting a sanity check (a quick, run-through check of the NMS to ensure that the basics are working).
- **Chapter 6, Troubleshooting** describes how to solve most common problems.

For further information, please refer to on-line help. The on-line help is available by clicking **Help** menu link in NMS and Administrator Console user interfaces.

1 System requirements

Please note that system sizing (calculation of CPU power, RAM, disk space, database space) is strictly dependent on the amount of data stored (number of managed elements, data retention times, etc.). Estimated storage requirements for a year of operation can be calculated based on the following formula:

$$\text{Storage size} = 40\text{MB} * \langle \text{number of managed elements} \rangle$$

Please note that the above formula is to be used as a high-level guidance only. Please contact Verax Systems technical support in order to obtain detailed sizing information for your particular installation.

1.1 Hardware and operating system requirements

NMS has been written entirely in the Oracle (Sun) Java programming language. Due to Java's portable nature, NMS runs on most of modern computer systems. The following platforms are regularly tested and are supported by Verax Systems:

- 32 and 64 bit (recommended) Linux distributions including: RedHat Enterprise, CentOS, SuSE and Debian using i386 and x64 architectures.
- 32 and 64 bit Microsoft systems including: Windows 2000, XP Professional Edition, Server 2003, Vista and Windows 7 (WMI support is required).
- Oracle (Sun) Solaris 10 and higher on Intel and SPARC hardware.
- IBM AIX 5 and higher on IBM Power Systems (formerly RS/6000 and p Series).

NMS can be installed in any operating environment supporting Java 1.6, such as AS/400, FreeBSD, Mac OS X and others. In case of doubt, please contact us to obtain up-to-date information on compatibility with other platforms.

1.1.1 Server side requirements

The NMS requires about 650 MB of disk space to install.

WIN

When using the bundled Oracle 11 Express Edition (Oracle XE), additional 5 GB of disk space is required for Oracle.

Estimated RAM size requirements can be calculated based on the following formula:

$$RAM\ size = 2GB + (30MB * \langle number\ of\ managed\ elements \rangle)$$

Please note that the above formula is to be used as a high-level guidance. Please contact Verax Systems technical support in order to obtain detailed sizing information for your particular installation.

1.1.2 Client workstations

Client workstations have to be equipped with a web browser: Internet Explorer 7, Firefox 2, Opera 8, Chrome 5 and higher versions with Adobe Flash plugin version 11 or higher (these are tested and verified on a regular basis). Compatibility with other, less popular browsers (e.g. Safari) is verified periodically. In case of doubt, please contact us to obtain up-to-date information on browser compatibility.

For comfortable work, client workstations should have 1GB of free RAM and Microsoft CPU index of 2.0.

1.1.3 Network

The NMS server requires a static IP address. It is recommended that the server has a properly configured DNS (Domain Name System) alias resolvable both on the server and the connecting workstations.

- ☛ Under some virtualized environments (e.g. OpenVZ), virtual network interfaces do not have associated MAC addresses. In such cases, the NMS will not read license file, as it is tied to the MAC address. The environment has to be configured in such a way that MAC addresses are set on virtual adapters.

1.1.4 GSM modem

GSM modem is required in order to enable sending notifications via text messages (SMS) to mobile phones. Verax NMS can use any GSM modem that:

- Supports Short Message Service (SMS),
- Is compatible with extended Hayes AT command set (ETSI GSM 07.05 - 3GPP TS 27.005),
- Has a driver with virtual serial port support available for target operating system (i.e. the modem appears as an additional serial port in the system).

1.1.5 Java

NMS is tested on Oracle (Sun) and IBM editions of Java on a regular basis. Compatibility with other, less popular editions (e.g. Open JDK) is verified periodically. Verax Systems recommends using the Oracle version of JRE for NMS production environments.

1.2 Database system

Verax NMS supports an Oracle 9i, 10g and 11g (including the free of charge Express Edition), which are tested on a regular basis. Oracle is the recommended database system for NMS production environments. However, the NMS can use any database supporting ANSI SQL and JDBC standards. Compatibility with MySQL, Microsoft SQL Server, DB2 and PostgreSQL is ensured periodically. In case of doubt please contact us to obtain up-to-date information on database and version compatibility.

1.2.1 Configuring NMS to work with MySQL

Due to licensing limitations, the MySQL JDBC driver (a.k.a. the Java connector) cannot be distributed with NMS and has to be manually downloaded from the Internet and copied to the relevant NMS installation directories. The JDBC driver is required if MySQL database is used and for MySQL monitoring purposes.

WIN

The download and installation steps are presented on-screen by the Windows installer.

In order to add MySQL JDBC driver to an existing NMS installation:

1. Stop the NMS server as described in section 3.1.
2. Download the MySQL connector from <http://dev.mysql.com/get/Downloads/Connector-J/mysql-connector-java-5.1.14.zip> from <http://mirror.services.wisc.edu/mysql/> or other mirror listed at <http://www.mysql.com/downloads/connector/j/>

(please download version 5.1.14, as it has been tested and verified to work properly with Verax NMS).

- Unzip the downloaded file and copy the `mysql-connector-java-5.1.14\mysql-connector-java-5.1.14-bin.jar` file to the following locations (relative to the installation directory):

MySQL connector location list
<code>opt\verax\workers\lib</code>
<code>tomcat\webapps\enetworkmanagementsystem-fds\WEB-INF\lib</code>
<code>tomcat\webapps\eadministratorconsole-fds\WEB-INF\lib</code>

- Start the NMS server as described in section 3.1.

Configure JDBC connection to desired MySQL server in property files (see section 3.2).

2 System installation

2.1 Configuring operating system to work with NMS

2.1.1 Open file descriptors limits

LINUX

The limit of open file descriptors must be increased (the recommended value is 65535). In order to change the limit of open files for Linux, edit the `/etc/security/limits.conf` file and add (or change) the

following lines:

```
*    soft    nofile    65535
*    hard    nofile    65535
```

Reboot the system for the changes to take effect.

2.2 Differences between the Standard and Express versions

There are no differences in installation procedures between NMS Standard and Express editions.

2.3 Installation types

NMS can be installed using one of the following packages:

- **One-click Windows installer** with bundled Java runtime (JRE), Apache Tomcat application server and Oracle Express Edition (XE) database. This type of installation is described in detail in section 2.4.
- A **tar.gz archive** with NMS web application and Apache Tomcat server. Requires an installed Java runtime (1.6 or higher) and a running database server (Oracle or other supported system) as prerequisites. This installation is targeted for UNIX and Linux systems. This type of installation is described in detail in section 2.5.

2.4 Installation logins and passwords

NMS is a three-tier, enterprise Java application with extensive security mechanisms, requiring a number of logins and passwords to be configured. References to these appear in subsequent sections, therefore it is essential to describe them in more detail:

- **Database administrator login/password.** These define “root” database account such as SYS (Oracle) or root (MySQL) and are required at the installation stage to create and populate the database.
- **Database access login/password.** Due to security reasons NMS should not use the database administrator (e.g. Oracle SYS) password in order to communicate with the database. Instead, the installer creates a separate user account (name and password are provided at installation time).
- **NMS administrator password.** This is the “root” NMS account. This login is initially set to “admin” and password is set to “pass”.

2.5 Windows installer

The NMS installer for Windows includes all components required to run the system including the JRE, Apache Tomcat application server and Oracle Express database server. It also contains Verax Core services and Administrator Console, which are shared with other Verax applications.

- ① The installation **must** be performed on a user account with administrator privileges.
- ① The setup language is always **English**. Once installed, the NMS user interface language can be switched as required depending on the installed language packs.
- ① The NMS Installer verifies if Verax Core Services are already installed (if so, they are not installed for the second time). The installation steps described below assume that Core Services have not been yet installed.

In order to install NMS for Windows:

1. Copy the installation package to a temporary directory (e.g. the one specified by the environment variable `%TEMP%`) and run the following command:

WIN

```
nms-1.9.1-windows-installer.exe
```

2. Since the installer requires administrator privileges to run, a security message is displayed on Windows Vista and higher. Allow the installer to proceed by clicking the **Yes** button.
3. Once the package is verified by the installer, the welcome dialog is shown. Start the installation process by clicking **Next**.
4. Read and accept the end-user license agreement and click **Next**.
5. Register your name and company and click **Next**.
6. Specify target path where NMS and Core Services (if not installed) is to be installed (the default directory is `C:\Program Files\Verax Systems\`) and click **Next**.
 - ① On 64 bit systems **Program Files (x86)** is used as the target installation directory instead of **Program Files**.
7. Select the database type to be used:
Bundled Oracle 11g XE (default) – this option will install the bundled Oracle 11g Express Edition and configure it to work with NMS: create SYS user, create NMS database user and prepare the NMS database schema.

Already existing Oracle – this option allows installing NMS to work with an already existing database. Please note that at the time of installation, the database must be accessible and database access login for NMS must have already been created.

Select the database type and click **Next** to proceed with the installation.

The procedure below describes installation with the bundled Oracle Express:

1. If an existing copy of Oracle Express is found on your system, the installer will detect and recommend using it.
2. In order to create a new database user, the SYS user and password must be known and provided at installation time. If an existing database/user is to be used, database connection details (username and password, Oracle management HTTP port, database listener port and transaction server port) must be known and provided at installation time.
3. If creating NMS database using an already existing database user, the SYS user and password must be also provided in order to update parameters of the user account. Alternatively, if SYS credentials are not known at installation time, the installer will display SQL queries to be executed by a system administrator once the installation has been completed.
4. Provide and confirm database credentials and parameters and click **Next** to proceed.

① Please note that on Oracle XE each user has only a single associated schema.

The procedure below describes installation steps with an already existing database:

1. Select database connection properties in the dialog box and click **Next**.

2. The installer will attempt to establish a database connection using the credentials provided. The connection must be tested before proceeding.

Once the database has been configured, the subsequent installation steps are as follows:

3. Provide username and password for the SYS user account and click **Next**.
 - ① In this case, the master password (see section 2.3) is set to the same value as the NMS administrator password.
4. Provide the TCP ports for NMS and Core Services (if not installed), server name as DNS name (preferably) or IP address for the NMS server (the installer will automatically attempt to resolve and suggest the DNS name) and click **Next**. At this stage experienced system administrators may want to change other Apache Tomcat parameters (click the **Restore defaults** button to revert to default port values). The installer checks if the specified ports are free. The installer configures NMS to use the HTTP port 9400 and Core Services (if not installed) to use the port 9200.
5. Provide Windows program group (Verax NMS by default) and click **Next** to start the installation.

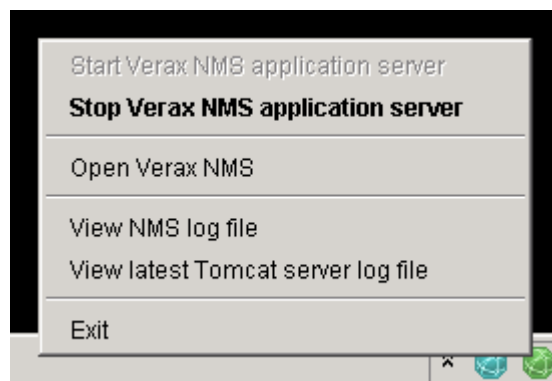
6. If Windows firewall is enabled, confirm Java security settings as presented below:



Once the installation has been completed the system is up and running – please click on the NMS Tray Monitor icon to log in to NMS.

2.5.1 NMS and Core Services Application Server service and Tray Monitor

The Windows installer creates **NMS Application Server** and **Core Services Application Server** Windows services to automatically start and manage the Apache Tomcat Servers running NMS and Core Services respectively. Each service is managed by a separate **Tray Monitor** tool. The tray monitors start automatically and display application server status in the Windows system tray, located near the clock:



Right-clicking on the NMS Tray Monitor icon displays a menu with the following options:

- **Start Verax NMS application server** – starts the NMS application server,
- **Stop Verax NMS application server** – stops the NMS application server,
- **Open Verax NMS** – launches the browser and opens the NMS home page (same as double clicking on the tray monitor icon),
- **View NMS log file** – displays the application log file for NMS (this option is typically used for troubleshooting and support purposes),
- **View latest Tomcat server log file** – displays the current Tomcat application server log file for troubleshooting the application server rather than the NMS,
- **Exit** – Turns off the NMS Tray Monitor (it does **not** shut the NMS application server down). The Tray Monitor can be restarted from the Windows Start Menu Verax NMS group.

Pop-up menu displayed by right-clicking on the Core Services Tray Monitor icon contains similar options as above for Core Services.

NMS and Core Services application servers run as Windows services (**Verax NMS Application Server** and **Verax Core Services Application Server** respectively) and once installed, they can be managed by launching "Services" from the Windows Control Panel → Administrator Tools or typing "Services.msc" in the Run command in the Windows Start Menu.

2.6 Archive based installation

The archive based installation is for UNIX systems only. For Microsoft Windows, please use the Windows Installer as described in section 2.4.

2.6.1 Prerequisites

The following items should be checked before the installation:

- The amount of available disk space (refer to section 1.1.1 for information on the required disk space) on the installation drive.
- Availability of target TCP port on the server (typically 80 or other if non-default setting is to be used).
- Availability of the database server (refer to section 1.2 for the list of supported database systems).

2.6.2 Starting the installation

In order to install NMS, copy the installation files to a temporary directory (for instance `/tmp`), invoke the following command from the directory:

```
chmod +x install.bin
```

Next run the installation script:

```
LINUX ./install.bin
```

```
SOLARIS ./install.bin
```

```
AIX ./install.bin
```

Please follow the on-screen instructions as they appear.

The installation process consists of the following steps:

- Target directory selection (by default `/opt/verax`).
- Acceptance of the License Agreement.
- Discovery and selection of the Java Runtime Environment to be used (it can be changed after the installation in the `java.conf` file – refer to section 3.2 for details).
- TCP connection port selection. The default value is 9400. Availability of the port will be checked by the installer; however, if another application is using the selected port and is not running at installation time, the conflict will not be detected.
- The final stage of installation is adding startup scripts to `/etc/init.d` for runlevels 3, 4, 5 on Linux and runlevel 3 on Solaris and AIX.

2.6.3 Validating the installation

In order to check if the installation succeeded, run core services and NMS from the command line as presented below:

LINUX

```
/etc/init.d/verax-core start  
/etc/init.d/verax-nms start
```

SOLARIS

```
/etc/init.d/verax-core start  
/etc/init.d/verax-nms start
```

AIX

```
/etc/rc.d/init.d/verax-core start  
/etc/rc.d/init.d/verax-nms start
```

Once the server startup has been completed (it can take even up to a few minutes on slow systems), point the browser to the NMS server URL (e.g. <http://localhost:9400>).

If the NMS configuration page is displayed, the installation was successful and database settings can be configured as provided in section 2.6. If possible, test NMS startup after a reboot.

2.6.4 Managing runlevels

2.6.4.1 Linux

In order to change core services and NMS startup at boot (or runlevel change) time, use the `chkconfig` command.

① All the subsequent commands should be run in the root account context.

In order to deactivate automatic startup of core services and NMS server at runlevel 3, run:

```
chkconfig --level 3 verax-core off
```

```
chkconfig --level 3 verax-nms off
```

In order to disable core services and NMS server completely, use the following command:

```
chkconfig --level 345 verax-core off
```

```
chkconfig --level 345 verax-nms off
```

In order to re-enable core services and NMS startup at boot time (for levels 3, 4, 5), run:

```
chkconfig --level 345 verax-core on
```

```
chkconfig --level 345 verax-nms on
```

Runlevels at which core services and NMS is running can be checked using:

```
chkconfig --list verax-core
```

```
chkconfig --list verax-nms
```

2.6.4.2 Other UNIX systems

On other UNIX systems and on Linux versions that do not support the `chkconfig` command (see section 2.5.4.1), runlevel configuration for NMS is changed using the startup scripts as shown below (the examples demonstrate how to remove and add NMS to Linux, Solaris and AIX):

Remove:

LINUX

```
rm /etc/rc3.d/S77verax-nms
```

SOLARIS

```
rm /etc/rc3.d/S77verax-nms
```

AIX

```
rm /etc/rc.d/rc3.d/S77verax-nms
```

Add:

LINUX

```
ln -s /etc/init.d/verax-nms /etc/rc3.d/S77verax-nms
```

SOLARIS

```
ln -s /etc/init.d/verax-nms /etc/rc3.d/S77verax-nms
```

AIX

```
ln -s /etc/rc.d/init.d/verax-nms /etc/rc.d/rc3.d/S77verax-nms
```

2.7 First login

The administrator user account with the default password is created by the NMS upon the first run. The default login and password are **admin** and **pass**.

2.8 Upgrades

In order to upgrade NMS (regardless of the installation type), perform the following steps:

1. Uninstall older version of the NMS without removing the database.
2. Install the new version, specifying an existing database. The NMS will automatically upgrade the database schema to the new version.

☛ Always back up your NMS database before performing upgrades.

2.9 Third party management library installation

Some systems require additional installation of vendor provided libraries, which cannot be bundled with Verax NMS due to licensing or other reasons. These libraries typically come free of charge and can be freely downloaded. The libraries need to be copied to:

`<installation directory>/var/verax/external/lib`

The following systems require additional management libraries:

System	Libraries
IBM WebSphere	<code>com.ibm.mq.commonservices.jar</code> <code>com.ibm.mq.connector.jar</code> <code>com.ibm.mq.headers.jar</code> <code>com.ibm.mq.jar</code> <code>com.ibm.mq.jmqi.jar</code> (the libraries above come with WebSphere distribution) <code>com.ibm.mq.pcf.jar</code> (downloaded from http://www-01.ibm.com/support/docview.wss?uid=swg24000668)
MySQL	<code>mysql-connector-java-5.1.14-bin.jar</code> (available from MySQL download site)

3 System configuration

3.1 Starting, stopping and restarting NMS

In order to manage the status of the NMS service (or daemon on UNIX), use the Control Panel (Windows) or `/etc/init.d/verax-*` scripts (UNIX). The example below provides instructions on how to restart the core services (including the Administrator Console) and NMS application server:

LINUX

```
/etc/init.d/verax-core restart  
/etc/init.d/verax-nms restart
```

SOLARIS

```
/etc/init.d/verax-core restart  
/etc/init.d/verax-nms restart
```

AIX

```
/etc/rc.d/init.d/verax-core restart  
/etc/rc.d/init.d/verax-nms restart
```

WIN

Start **NMS Tray Monitor** (refer to section 2.4.1 for details).

Right-Click on the tray icon to display the pull-down menu.

Select **Stop NMS Application Server**.

Repeat the same steps and select **Start NMS Application Server**.

3.2 Configuration file directory

All the NMS component configuration files are located in `/etc/verax.d` (UNIX/Linux) or `c:\Windows\etc\verax.d` directories (Windows). The configuration files have `.properties` extensions.

The following table has a list of all the configuration files (please read the instructions provided in each file for information on individual configuration parameters):

File	Contains
<code>eNMS.properties</code>	Main NMS configuration file. Please note that this file is only for the core NMS, the NMS workers configuration (e.g. performance collectors) is contained in the <code>eNMSWorker.properties</code> .
<code>eNMSWorkers.properties</code>	Verax Network Management System (NMS) workers configuration file. Please note that this file is only for the NMS workers (e.g. performance collectors), for the core NMS system configuration see <code>eNMS.properties</code> .
<code>eAdministratorConsole.properties</code>	Administrator Console configuration file.
<code>eBatchManager.properties</code>	Verax Batch Manager configuration file. The batch manager is a CRON-like scheduler responsible for running background processes such as generating business reports, spawning alarm collectors, event processors (these are also referred to as NMS workers).

File	Contains
<code>htmlGateway.properties</code>	Verax Network Management System (NMS) HTML gateway configuration file. The HTML gateway provides a simplified web-based interface (as opposed to the fully functional RIA/Flex interface), mainly for mobile clients (e.g. iPhone).

Application server and Java parameters for the default, installation-provided Apache Tomcat server are stored in the following directories:

```
<installation directory>\tomcat-nms\bin
```

```
<installation directory>\tomcat-nms\conf
```

for NMS application server and:

```
<installation directory>\tomcat-ac\bin
```

```
<installation directory>\tomcat-ac\conf
```

for Core Services.

Please refer to the Apache Tomcat (<http://tomcat.apache.org/tomcat-6.0-doc/config/context.html>) documentation for detailed information.

3.3 Changing database settings

Database access parameters are configured for each system component separately in the property files described in section 3.2.

3.4 Changing the Java Runtime Environment

Changing the JRE used by NMS may be helpful during testing JRE or migrating from 32- to 64-bit environments. The procedure for changing the JRE used is different under UNIX and Windows, as described in the following sections.

- ① Please note that the changes described below do not affect NMS workers (background services). NMS workers are fully controlled by the Batch Runner (part of Verax Core Services). In order to change JRE for NMS workers, login to the NMS, navigate to **Settings** and **Worker management**. For each worker click **Edit** and change the **Command** field as required (java specified at the command line).

3.4.1 UNIX

Under UNIX, edit the `JAVA_HOME` parameter of the `/opt/verax/tomcat-*/bin/catalina.sh` for application servers. Set the value to point to the new JRE and **restart** the core services and NMS server as described in section 3.1.

3.4.2 Windows

For installations created with the Windows Installer, the JRE change procedure is as follows:

1. Open `<installation directory>\tomcat-*\bin\service.bat` file (it is a slightly modified version of the standard Apache Tomcat service file) and modify the `PC_JVM` variable as required (please note that this variable appears twice in the file).

2. **Restart** the NMS server as described in section 3.1.

- ① Please note that the change does not affect the Tray Monitor application (described in section 2.4.1) as it always uses the bundled JRE.

3.5 Changing JRE parameters

JRE parameter changes, such as the amount of allocated memory, are mainly required during performance optimization and fine tuning. The procedure for changing JRE parameters for NMS is different for UNIX and Windows systems, as described in the subsequent sections.

- ① Please note that the change does not affect NMS workers (background services). NMS workers are fully controlled by Batch Runner component and their configuration is maintained in the NMS database. To change NMS workers configuration, login to the NMS console, then go to **Settings** and **Worker management** view. For each worker click **Edit** action and edit **Command** field accordingly.

! Please familiarize yourself with JRE parameters and their meanings before making any changes. Relevant documentation is available at <http://java.sun.com/javase/downloads/index.jsp#docs>.

3.5.1 UNIX

Under UNIX, the JRE parameters are provided in the `JAVA_OPTS` environment variable in the `/opt/verax/tomcat-*/bin/catalina.sh` file. In order to change the JRE parameters and restart the core services and NMS server as described in section 3.1.

3.5.2 Windows

Under Windows, the parameters are located in the `<installation directory>\tomcat-nms\bin\service.bat` at the end of the file. For details, please refer to the instructions provided in the file.

3.6 Creating and configuring a standalone NMS database

The subsequent sections assume that the database server has already been installed – they only contain information on database instance creation, configuration, fine-tuning, sizing, etc. and not the database system installation itself. In order to install the database server, follow your vendor’s instructions.

3.6.1 Oracle

3.6.1.1 Creating an NMS database

Verax Systems recommends using Oracle Database version 10.2.0.5 or higher and Database Configuration Assistant (DBCA) for creating new NMS databases in the Oracle environment. Under UNIX systems, DBCA can be started with the `dbca` command. Under Windows, select the **Start** menu, **Programs** then click **Oracle** and select **Configuration and Migration Tools**. A menu with Database Configuration Assistant should appear. Click on the **DBCA** icon to launch the tool.

Once the DBCA is started, perform the following steps to create the NMS database:

1. Click **Next** at the welcome screen to begin.
2. Select **Create a database** and click **Next** to navigate to the screen with database templates.
3. Select **General Purpose** and click **Next**.
4. Set the **SID** and **Global Database Name** to `ossbss` and click **Next**.
5. Turn the options **Configure the Database with Enterprise Manager** and **Enable daily backup** on.

6. Set time at which the backup is to be made (for example 2:00 a.m.). Enter correct login and password for **OS Username** and **Password** fields specifying a user with database access rights. Under Windows, it will usually be a user with administrator rights. Under UNIX, it will most likely be the **oracle** user. Click **Next** to continue.
7. Provide administrator account passwords for the database. Enter a single password for all accounts (default) or set different password to each of the administrator accounts by selecting **Use Different Passwords**. Click **Next** to continue.
8. Select a data storage mechanism. The recommended method is **File system**. Confirm selection with **Next**.
9. Select a directory for the database. It is recommended to choose **Use Common Location for All Database Files** and select the **db_1** subdirectory located underneath Oracle home. Click **Next** to continue.
10. Leave database recovery settings intact and confirm with the **Next** button.
11. Skip creation of sample schemas confirm with the **Next** button.
12. Set database character to **Unicode (AL32UTF8)** in the **Character Sets** tab and select English as the **Default Language**. Click **Next** to continue.
13. Set redo logs files size to minimum 200MB, leave other parameters of the database storage intact and confirm with the **Next** button.
14. If all settings described above are entered correctly, a **Create Database** option appears on the screen. In order to create the database, click **Finish** and confirm with **OK**.

15. The database is created after about 20-40 minutes (depending on the server hardware). Once the database is created, the global database name, SID and address of the Oracle Enterprise Manager are displayed. **Please make a note** of this information and leave the DBCA by pressing the **Exit** button.

16. In order to start the newly created database at boot time, it is necessary to specify `y` in the file `/etc/oratab` in configuration database line (UNIX systems). Under Windows, use the Oracle Administration Assistant for Windows in the menu **Start/Programs/Oracle - database name/Configuration and Migration Tools**. Select the NMS database by right-clicking and:

- a. Select **Startup/Shutdown Options**,
- b. Go to the **Oracle NT Service** tab,
- c. Choose **Automatic** in **Oracle Service Startup Type** and confirm by pressing **OK**.

After creating the database schema, create a user named 'nms' through Oracle Enterprise Manager web-console or using `sqlplus` from the command line as described in sections 3.6.1.2 and 3.6.1.3 below.

Please note that the following information is required at a later time to configure NMS database access:

- SID of the database (point 4 above),
- Login and password for user with database administrator rights (point 7 above),
- The URL for Oracle Enterprise Manager (point 15 above).

Once the database has been created, a new user account should be created for NMS.

When installation is finished it's important to set following Oracle database parameters:

Parameter name	Oracle 10g	Oracle 11g
processes	150	300
sessions	300	500
transactions	330	Unlimited
db_writer_processes	2	2
open_cursors	300	500
session_cached_cursors	50	100
cursor_sharing	SIMILAR	SIMILAR
cursor_space_for_time	TRUE	TRUE

To set database parameters, use the following command sequence:

1. Login to sqlplus as sysdba

```
sqlplus sys as sysdba
```

2. Issue the following SQL command for all parameters listed in the above table:

```
alter system set <parameter>=<new_value> scope=spfile;
```

3. Shutdown and then startup database

```
shutdown immediate
```

```
startup
```

3.6.1.2 Creating a user from the Oracle Enterprise Manager

In order to create a user schema using the Oracle Enterprise Manager (EM), perform the following steps:

In order to create the user schema:

1. Point a web browser to the EM URL. The EM address is: `<server IP address>:<port number from portlist.ini>/em`, for instance `192.168.1.1:1158/em`.
2. Log in as `SYSDBA` with `Connect As SYSDBA` option.
3. Go to the **Administration** tab and select **Tablespaces**.
4. Check if `VERAX_NMS` tablespace exists on the list of tablespaces.
5. If not, select **Create** button. On the **Create Tablespace->General** tab window, enter following parameters:
Name: `VERAX_NMS`
Extent management: select `Locally Managed`
Type: select `Permanent`
6. Add datafile by clicking **Add** and then specify name like `verax_nms.dbf`, initial file size of 1GB for Oracle 10g or 4GB for Oracle 11g. Select **Automatically extend datafile when full** option and specify 256MB into **Increment** and 4GB for Oracle 10g or 11GB for Oracle 11g into **Maximum File Size** parameter and click **OK**.
7. Select **Create Tablespace->Storage** tab and select the following parameters:
Extent Allocation: select `Automatic`

Segment Space Management: select **Automatic**

Enable logging: select **no** and click OK button.

8. Go to the **Administration** tab and select **Users**.
9. Go to the **Actions** window, select **Create Like** and confirm by clicking the **GO** button. A new user creation wizard appears.
10. Specify the required fields. It is recommended to set **Default Tablespace** to **VERAX_NMS** and **Temporary Tablespace** to **TEMP**.
11. Go to the **ROLES** bookmark. Use **Edit List** to enable management of the user rights. The new user should be given **CONNECT** and **RESOURCE** roles.
12. Go to the **SYSTEM PRIVILEGES**. Use **Edit List** to modify system privileges. The new user should have **UNLIMITED TABLESPACE** privilege.
13. Apply changes. Upon success, the following message is displayed:
The object has been created successfully.

3.6.1.3 Creating a user from the command line (SQL Plus)

Under UNIX, log in using an account with administrator rights (usually oracle). Under Windows, log in as administrator and open the console window (`cmd`).

Set `ORACLE_SID` environment variable to point to the NMS database, for example:

LINUX	<code>export ORACLE_SID=ossbss</code>
	<code>echo \$ORACLE_SID</code>
WIN	<code>set ORACLE_SID=ossbss</code>
	<code>echo %ORACLE_SID%</code>

Start the SQL Plus tool with the following command at the prompt (the command is identical for UNIX and Windows):

```
sqlplus "/as sysdba"
```

In order to create a new user, create the Verax tablespace first:

Oracle 10g	Oracle 11
create tablespace VERAX_NMS	create tablespace VERAX_NMS
nologging	nologging
datafile 'verax_NMS.dbf'	datafile 'verax_NMS.dbf'
size 1G	size 4G
autoextend on	autoextend on
next 256m maxsize 4G	next 256m maxsize 11G
extent management local;	extent management local;

Then, issue the following command at the SQL Plus command prompt (please modify the password):

```
create user nms identified by passwd
default tablespace verax_nms temporary tablespace temp account
unlock ;

alter user nms quota unlimited on VERAX_NMS;
```

Grant required rights:

```
grant connect to nms;
grant resource to nms;

grant select_catalog_role to nms;
grant select any dictionary to nms;
grant create view to nms;
grant unlimited tablespace to nms;
grant create any directory TO nms;
grant drop any directory TO nms;
grant execute on utl_file to nms;
```

Make changes effective and exit SQL Plus:

```
commit;
exit
```

3.6.2 MySQL

3.6.2.1 Server parameters

Verax System recommends to use MySQL Server version 5.5.

To ensure optimum NMS performance on MySQL, Verax Systems recommends setting the server parameters in the `my.cnf` file as follows:

```
# The following options will be passed to all MySQL clients

[client]

port                = 3306

socket              = /var/lib/mysql/mysql.sock

[mysqld]

default-storage-engine = MYISAM

skip-innodb

port                = 3306

socket              = /var/lib/mysql/mysql.sock

open_files_limit    = 10000

slow-query-log=true

slow-query-log-file=/var/log/verax/slow.log

long_query_time     = 3

#skip-locking

key_buffer          = 384M

max_allowed_packet  = 1M

table_cache         = 512

sort_buffer_size    = 1M

read_buffer_size    = 1M

read_rnd_buffer_size = 1M

mysam_sort_buffer_size = 64M

#set mysam_max_sort_file_size to 10g to avoid Repair by keycache when creates big
index

mysam_max_sort_file_size = 10G

thread_cache_size   = 8
```

```
# Try number of CPU's*2 for thread_concurrency

thread_concurrency = 8

max_heap_table_size = 128M

query_cache_size = 64M

low_priority_updates = true

skip-federatedserver-id      = 1

[mysqldump]

quick

max_allowed_packet = 1M

[mysql]

no-auto-rehash

#safe-updates
```

```
[isamchk]

key_buffer = 2M

sort_buffer_size = 2M

read_buffer = 2M

write_buffer = 2M

[mysqlhotcopy]

interactive-timeout
```

Please note that the above settings may differ depending on specific server parameters and NMS configuration.

General MySQL recommendation for parameter settings have been listed below (please note that they are already included in my.conf listing above):

Session variables	Value
max_allowed_packet	1.0 MB
sort_buffer_size	1.0 MB
net_buffer_length	16.0 KB
thread_stack	192.0 KB
read_rnd_buffer_size	1.0 MB
read_buffer_size	1.0 MB
join_buffer_size	128.0 KB
Total (per session)	4.3 MB

Global variables	Value
query_cache_size <i>Recommended values: 32M to 512M. Larger values may lead to system slow down.</i>	128.0 MB
key_buffer_size <i>The key_buffer_size affects the size of the index buffers and the speed of index handling, particularly reading. It should be set to 20-25% of total memory.</i>	1.0GB
Total	1.1 GB

Total RAM needed (for 600 connections): 3.7 GB

The NMS database should be created in the MyISAM mode (rather than InnoDB mode). InnoDB should be disabled using `skip-innodb` option in `[mysqld]` section in `my.cnf` configuration file.

The MyISAM engine should be the default one (NMS creates its tables in the default engine mode). To set MyISAM as default engine please set parameter `default-storage-engine = MYISAM` in section `[mysqld]` in `my.cnf` configuration file. In order to check if MyISAM is the default engine, invoke the following command from the MySQL prompt:

```
SHOW ENGINES;
```

MYISAM should be marked as the default engine.

```
MEMORY      YES
```

```
CSV         YES
```

```
MRG_MYISAM  YES
```

```
BLACKHOLE  YES
```

```
MyISAM     DEFAULT
```

```
InnoDB     NO
```

```
ARCHIVE    YES
```

```
FEDERATED  NO
```

```
PERFORMANCE_SCHEMA  YES
```

To avoid using keycache (which is 5 times slower method than using temp space) when creating/rebuilding indexes set parameter `myisam_max_sort_file_size` to 10G and `tmpdir` to directory with minimum 10GB of free space.

3.6.2.2 Creating the database

In order to create a database instance for NMS, log in to the server (using the command `mysql-u root-p`) and run the following command:

```
CREATE DATABASE ossbss;
```

For security reasons, create a new user named 'nms' and grant him all database rights (this is to avoid specifying root credentials while setting the NMS database parameters):

```
GRANT ALL PRIVILEGES ON ossbss.* TO 'nms'@'localhost' IDENTIFIED  
BY 'some_pass' WITH GRANT OPTION;  
FLUSH PRIVILEGES;
```

- ① If the database is not on the same server as NMS, replace localhost IP address of the server.

Replace 'some_pass' in the command above with a password corresponding to your local security policy.

For collecting a lot of data on 1st and 2nd aggregation level, especially for installation containing above 100 managed elements, Verax Systems recommends to partition data tables for counters and sensors for those levels. By default, NMS creates non partitioned tables. To change this behavior, execute following script before NMS will start and creates standard tables:

```
CREATE TABLE OSS_SENSOR_DATA_1 (  
    SENSOR_DATA_ID BIGINT(20) NOT NULL AUTO_INCREMENT,  
    SENSOR_DATA_COL_STAT INT(11) DEFAULT NULL,  
    SENSOR_DATA_RESPONSE_TIME INT(11) DEFAULT NULL,  
    SENSOR_DATA_SENSOR_FK BIGINT(20) DEFAULT NULL,  
    SENSOR_DATA_TIME DATETIME DEFAULT NULL,
```

```
PRIMARY KEY (SENSOR_DATA_ID, SENSOR_DATA_SENSOR_FK) ,
KEY IDX_SENSOR_FK_SD_1 (SENSOR_DATA_SENSOR_FK) ,
KEY IDX_SENSOR_DATA_COL_STAT_1 (SENSOR_DATA_COL_STAT) ,
KEY IDX_SENSOR_SAMPLING_WINDOW
(SENSOR_DATA_SENSOR_FK,SENSOR_DATA_TIME)
) ENGINE=MYISAM DEFAULT CHARSET=LATIN1 MAX_ROWS=1000000000;

ALTER TABLE OSS_SENSOR_DATA_1 PARTITION BY
HASH(SENSOR_DATA_SENSOR_FK) PARTITIONS 100;

CREATE TABLE OSS_SENSOR_DATA_2 (
    SENSOR_DATA_ID BIGINT(20) NOT NULL AUTO_INCREMENT,
    SENSOR_DATA_COL_STAT INT(11) DEFAULT NULL,
    SENSOR_DATA_RESPONSE_TIME INT(11) DEFAULT NULL,
    SENSOR_DATA_SENSOR_FK BIGINT(20) DEFAULT NULL,
    SENSOR_DATA_TIME DATETIME DEFAULT NULL,
    PRIMARY KEY (SENSOR_DATA_ID, SENSOR_DATA_SENSOR_FK) ,
    KEY IDX_SENSOR_FK_SD_2 (SENSOR_DATA_SENSOR_FK) ,
    KEY IDX_SENSOR_DATA_COL_STAT_2 (SENSOR_DATA_COL_STAT) ,
    KEY IDX_SENSOR_SAMPLING_WINDOW_2
(SENSOR_DATA_SENSOR_FK,SENSOR_DATA_TIME)
) ENGINE=MYISAM DEFAULT CHARSET=LATIN1 MAX_ROWS=1000000000;

ALTER TABLE OSS_SENSOR_DATA_2 PARTITION BY
HASH(SENSOR_DATA_SENSOR_FK) PARTITIONS 50;
```

```
CREATE TABLE OSS_COUNTER_DATA_2 (
    COUNTER_DATA_ID BIGINT(20) NOT NULL AUTO_INCREMENT,
    COUNTER_DATA_COL_STAT INT(11) DEFAULT NULL,
    COUNTER_FK BIGINT(20) NOT NULL,
    COUNTER_DATA_TIME DATETIME DEFAULT NULL,
    COUNTER_DATA_VALUE FLOAT DEFAULT NULL,
    PRIMARY KEY (COUNTER_DATA_ID,COUNTER_FK),
    KEY IDX_COUNTER_FK_CD_2 (COUNTER_FK),
    KEY IDX_COUNTER_DATA_COL_STAT_2 (COUNTER_DATA_COL_STAT),
    KEY IDX_COUNTER_SAMPLING_WINDOW_2
(COUNTER_FK,COUNTER_DATA_TIME)
) ENGINE=MYISAM DEFAULT CHARSET=LATIN1 MAX_ROWS=1000000000;
ALTER TABLE OSS_COUNTER_DATA_2 PARTITION BY HASH(COUNTER_FK)
PARTITIONS 100;
```

```
CREATE TABLE OSS_COUNTER_DATA_1 (
    COUNTER_DATA_ID BIGINT(20) NOT NULL AUTO_INCREMENT,
    COUNTER_DATA_COL_STAT INT(11) DEFAULT NULL,
    COUNTER_FK BIGINT(20) NOT NULL,
    COUNTER_DATA_TIME DATETIME DEFAULT NULL,
    COUNTER_DATA_VALUE FLOAT DEFAULT NULL,
    PRIMARY KEY (COUNTER_DATA_ID,COUNTER_FK),
```

```
KEY IDX_COUNTER_FK_CD_1 (COUNTER_FK) ,
KEY IDX_COUNTER_DATA_COL_STAT_1 (COUNTER_DATA_COL_STAT) ,
KEY IDX_COUNTER_SAMPLING_WINDOW (COUNTER_FK,COUNTER_DATA_TIME)
) ENGINE=MYISAM DEFAULT CHARSET=LATIN1 MAX_ROWS=1000000000;
ALTER TABLE OSS_COUNTER_DATA_1 PARTITION BY HASH(COUNTER_FK)
PARTITIONS 300;
```

- ① For Linux, check the number of open files in `limits.conf` file. Add following lines to the `/etc/security/limits.conf` file:

```
mysql soft nofile 14096
```

```
mysql hard nofile 11024
```

MySQL parameter `open_files_limit` should be set too (recommended value is 10000).

4 Backup

Backup is an essential part of a disaster-recovery plan. It prevents permanent data loss and helps to restore data when it is needed. Verax NMS backup should be performed on a regular basis.

4.1 Backing up configuration files

In order to backup NMS configuration files, stop the system and archive all files in the following directories:

LINUX	<code>/etc/verax.d</code>
WIN	<code>c:\Windows\etc\verax.d</code>

For more details on configuration files, please refer to section 3.2 Configuration file directory.

4.2 Database backup

① Username, password and database name for Verax NMS can be found in `eNMS.properties` configuration file (`hibernate.connection.username`, `hibernate.connection.password` and `hibernate.connection.url` variables).

4.2.1 Backing up MySQL database

Back up Verax NMS database running on MySQL using `mysqldump` command. The dump syntax is:

```
mysqldump -u <username> <databasename> <backupfile> -p<password>
```

For instance:

```
mysqldump -u vxnms nms > vxnms.sql -pnms
```

4.2.2 Restoring MySQL Database

Before restoring the database, check database name username and password settings in `eNMS.properties` file. In order to restore MySQL database:

1. Stop Verax NMS.
2. Log in to MySQL database using command line:

```
mysql -u <username> -p<password>
```

3. Re-create the database on the target machine using the following commands:

```
DROP DATABASE <databasename>;
```

```
CREATE DATABASE <databasename>;
```

4. Load the file using the `mysql` command:

```
mysql -u <username> <database> < <backupfile> -p<password>
```

5. Start Verax NMS.
6. To create backup when database is running (without stopping Verax NMS):

```
mysqldump -u root databasename > filename.sql -p --lock-  
tables=false
```

It may take up to 15 minutes for Verax NMS to acquire data and restore up-to-date state of monitored objects.

4.2.3 Oracle data backup

In order to perform Oracle database backup:

1. Stop Verax NMS.
2. Open command line shell (Windows) or a terminal (UNIX systems).
3. Backup Oracle database using the following command:

```
exp <databasename> file=<backupfile>
```

for instance:

```
exp vxnms file=vxnms.dmp
```

4. Start Verax NMS.

4.2.4 Restoring Oracle database

In order to restore Oracle data, perform the following actions:

1. Stop Verax NMS.
2. Open command line shell (Windows) or a terminal (UNIX systems).
3. Invoke SQLPlus from the command line:

```
sqlplus /nolog
```

4. Log in to SQLPlus as the DBA user:

```
connect sys/ as sysdba
```

5. Remove previous user if exists, performing the following command:

```
DROP USER <username> CASCADE;
```

6. Create new user. Use the following SQL statement to create user:

```
CREATE USER <USERNAME> IDENTIFIED BY <PASSWORD>  
DEFAULT TABLESPACE VERAX_NMS TEMPORARY TABLESPACE TEMP  
ACCOUNT UNLOCK;
```

```
ALTER USER <USERNAME> QUOTA UNLIMITED ON VERAX_NMS;
```

7. Grant right to the newly created user by entering the following commands:

```
GRANT CONNECT TO <username>;
```

```
GRANT RESOURCE to <username>;
```

```
GRANT SELECT CATALOG_ROLE to <username>;  
GRANT SELECT ANY DICTIONARY to <username>;  
GRANT CREATE VIEW TO <USERNAME>;  
GRANT UNLIMITED TABLESPACE TO <USERNAME>;  
GRANT CREATE ANY DIRECTORY TO <USERNAME>  
GRANT DROP ANY DIRECTORY TO <USERNAME>;  
grant EXECUTE ON UTL_FILE to <USERNAME>;
```

8. Commit transaction issuing the following commands in the command line:

```
COMMIT;
```

```
EXIT;
```

9. Import backup file:

```
imp <username> file=backupfile.dmp fromuser=<username>  
touser=<username>
```

For instance:

```
imp vxnms file=vxnms.dmp fromuser=vxnms touser=vxnms
```

10. Start Verax NMS.

It may take up to 15 minutes for Verax NMS to acquire data and restore up-to-date state of monitored objects.

5 Sanity check

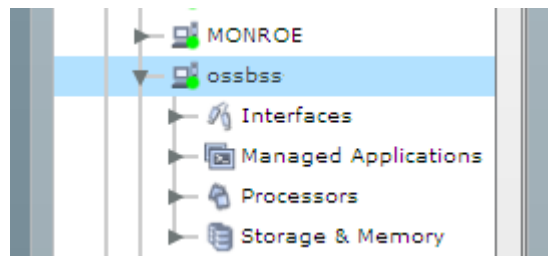
Verax NMS can check its own health and status, including server machine, database and application server.

Please check online help to find out how to monitor devices and applications under Verax NMS server.

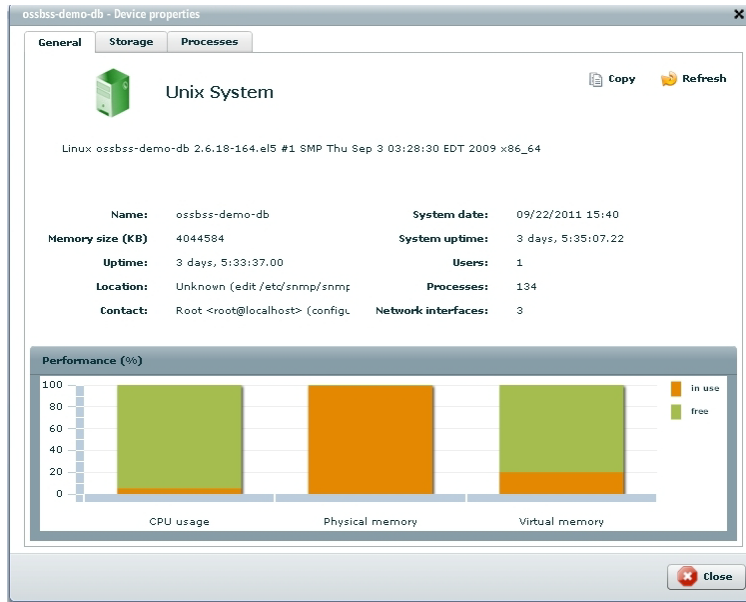
5.1 Server check

In order to perform the sanity check on Verax NMS server:

1. Find Verax NMS host server on an aspect tree and double click to expand it.



2. Select **show advanced view** option from the **Device details** section. A details windows will pop up:



3. Check workers statuses in the **Processes** tab.

Image name	Path	Parameters	CPU (centi-)	Memory (KE)	PID	Type
khubd	khubd		0	0	220	application
khelper	khelper		1	0	8	application
kblockd/1	kblockd/1		81	0	55	application
kblockd/0	kblockd/0		116	0	54	application
kauditd	kauditd		2	0	626	application
kacpid	kacpid		0	0	56	application
java	/usr/local/java/bi	-jar /opt/verax/workers/eEver	55612	82336	2542	application
java	/home/oracle/ora	-server -Xmx256M -XX:MaxP	16129	154412	30512	application
java	/usr/local/java/bi	-jar /opt/verax/workers/eCou	104439	251248	2642	application
java	/usr/local/java/bi	-jar /opt/verax/workers/eSen	196559	252240	2640	application
java	/usr/local/java/bi	-jar /opt/verax/workers/eDat	7625	172464	2645	application
java	/home/oracle/ora	-Djava.awt.headless=true -Dc	1694	15136	31547	application
java	/usr/local/java/bi	-jar /opt/verax/workers/eDat	5121	64900	2641	application
irqbalance	irqbalance		629	328	3145	application
init	init [3]		284	572	1	application
hidd	/usr/bin/hidd	--server	0	360	3433	application
hcid	/usr/sbin/hcid		0	412	3272	application
hald-runner	hald-runner		1	564	3389	application
hald-addon-stor	hald-addon-stor		7457	420	3412	application
hald-addon-keuh	hald-addon-keuh		0	552	3403	application

The following workers should be up and running:

- **eEventDispatcher.jar**
- **eSensorCollector.jar**
- **eCounterCollector.jar**
- **eEventGenerator.jar**
- **eBackgroundManager.jar**

- `eEventGenerator.jar` (two instances should be running: for SNMP traps and syslog events)

If any of them are missing restart the NMS. If the problem persists please contact our support at nms@veraxsystems.com.

4. Close the window, find Verax NMS host server on an aspect tree and double click to expand it.
5. Go to **charts** tab and look at the performance charts. Check processor average load – a typical load should not exceed 40%.
6. Go to **Storage & Memory** charts and check available space. Typically at least 2GB of free disk space is required for NMS to run properly.

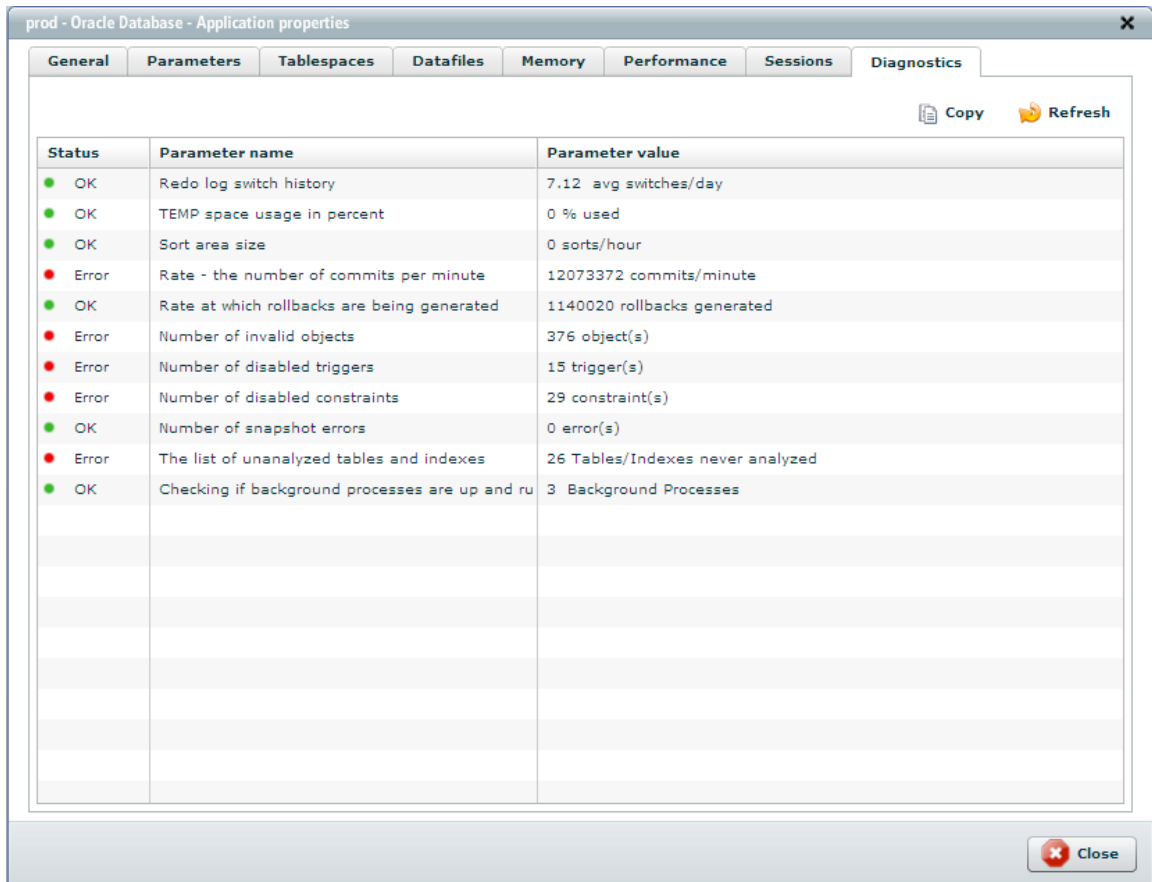
5.2 Oracle database check

In order to perform the NMS Oracle database sanity check:

1. Select Oracle instance used by Verax NMS in aspect tree under **Managed applications** on the server.
2. Check the following parameters:
 - Overall CPU utilization.
 - CPU utilization for database used by Verax NMS.

Values of these parameters on average should not exceed 40% (short peaks are acceptable).

3. Select **show advanced view** option and in the **Diagnostics** tab check status:



Status	Parameter name	Parameter value
OK	Redo log switch history	7.12 avg switches/day
OK	TEMP space usage in percent	0 % used
OK	Sort area size	0 sorts/hour
Error	Rate - the number of commits per minute	12073372 commits/minute
OK	Rate at which rollbacks are being generated	1140020 rollbacks generated
Error	Number of invalid objects	376 object(s)
Error	Number of disabled triggers	15 trigger(s)
Error	Number of disabled constraints	29 constraint(s)
OK	Number of snapshot errors	0 error(s)
Error	The list of unanalyzed tables and indexes	26 Tables/Indexes never analyzed
OK	Checking if background processes are up and ru	3 Background Processes

4. Enter **Performance** tab and check:
 - Top SQL queries (typical execution time should not exceed a few seconds).
 - Top sessions.
 - Table space size (should not exceed 90% of its total size).
 - Redo log switch history (logs should be switched maximum every 20 minutes).

5.3 Application server check

In order to perform NMS Application server (Apache Tomcat) sanity check:

1. Find Verax NMS application server on the aspect tree and click it.
2. Select **General** tab and check average response time. The values should not exceed 1 second.
3. Select **show advanced view**. A window will pop up.
4. Navigate to the **Applications** tab and check the number of sessions. This number should correspond to the number of users actually logged in (or having established a browser connection). A largely excessive number (e.g. 50, but 2 users logged in), indicates that session has not been terminated correctly and the server should be restarted.
5. Select the **Request processors** tab check Response summary for connector. The ratio of successful response to error response should be at least 5:1.

Name	Sessions	Max sessions
/host-manager	0	0
/manager	4	4
/enetworkmanagementsystem-fds	9	16

URL	Average response (ms)
HTMLHostManager	0
HostManager	0
jsp	0
default	0

6 Troubleshooting

6.1 Invalid license

PROBLEM:

NMS or Administrator Console reports an invalid license.

SOLUTION:

License mechanism in the NMS and the Administrator Console reports invalid licenses (e.g. exceeded number of allowed managed elements), but allows the applications to run.

In order to validate NMS license, perform the following steps:

1. Log in to Administrator Console.
2. Select **settings** from management context and click **Go**.
3. Ensure if there are at least 2 licenses with the following **Features**:
 - NMS_MANAGED_ELEMENTS
 - AC_NUMBER_OF_USERS
4. Navigate to **Licenses** tab and check if license is enabled. Enabled licenses are marked green.
5. If license is disabled – select **Enable** from the local action menu and click **Go**. Restart the application for this change to take effect.
6. Check the **Expiry date**. It must be before current date.
7. Check **counts**. The number of counts for NMS_MANAGED_ELEMENTS and AC_NUMBER_OF_USERS should not exceed the number of actual managed elements and number of users respectively.

6.1.1 Generating license request

In order to generate a license request for Verax NMS:

1. Log in to the Administrator Console.
2. Select **settings** from the management aspect drop down (upper right corner) and click **Go**.
3. Navigate to **Licenses** tab.
4. Select **Generate license request** from the global action menu and click **Go**.
5. Copy the license request information and send it to sales@veraxsystems.com.

6.1.2 Installing a license file

Once you receive license files via e-mail they need to be imported. In order to import license file:

1. Log in to the Administrator Console.
2. Select **settings** from the management aspect drop down (upper right corner) and click **Go**.
3. Navigate to **Licenses** tab.
4. Select **Import license file** from the global action menu and click **Go**.
5. Point to the license file and click **Open** to load it.
6. Restart the NMS for this change to take effect.

6.2 The NMS server responds but does not show anything

PROBLEM

Error loading NMS login screen in a web browser. Message reported by a web browser:

- **HTTP Error 404 - File or Directory not found**

SOLUTION

This situation occurs when Verax NMS cannot connect to the database.

1. Check if database server is up and running.
2. Verify if database connection settings in `eNMS.properties` file (`hibernate.connection.username`, `hibernate.connection.password` and `hibernate.connection.url` variables) are correct by connecting to the database using the settings using SQLPlus (Oracle) or mysql (MySQL).

6.3 The NMS server does not respond

PROBLEM

Error loading Verax NMS or Administrator Console login screen in a web browser. Message reported by a web browser:

- The connection was interrupted
- The connection was reset
- The connection has timed out

SOLUTION

1. Check if the right URL was used. The NMS URL can be obtained by examining the `eNMSWorker.properties` file – the URL is placed in the `nmsServer` variable. If the URL seems to be fine, try to use the IP address rather than a DNS name.
2. Check if the server is running, and restart it as described in section 3.1.
3. If the server cannot start, check TCP port availability for incoming connections using `netstat` in the command line shell (Windows) or a terminal (UNIX systems).

WIN

```
netstat -an | findstr <port>
```

LINUX

```
netstat -luntp | grep <port>
```

Where `<port>` is a port number as in the `eNMSWorker.properties` file (see paragraph 1 above).

Index

/	
/etc/init.d/verax-nms	21
/etc/oratab	34
/etc/rc.d/init.d/verax-nms	21
/etc/verax.d	27
/var/verax/external/lib	25
C	
chkconfig	22
D	
DNS	10
E	
eAdministratorConsole.properties	27
eBatchManager.properties	27
eNMS.properties	27, 48, 49, 60
eNMSWorker.properties	27, 61
H	
htmlGateway.properties	28
I	
install.bin	20
J	
JAVA_OPTS	30
M	
my.cnf	40
MySQL	
server parameters	40
MySQL - Creating partitioned tables	44
N	
Service.bat	29, 31
O	
OpenVZ	10
Oracle Database Configuration Assistant (DBCA)	32
Oracle database parameters	35
R	
Redo logs	33
S	
SID	32, 34, 38
sqlplus	34, 38
T	
TCP ports	
required	20
tray monitor	18
V	
Verax tablespace creating	38
W	
windows service	18