



# Sun OpenDS Standard Edition 2.0 Installation Guide



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# Directory Server System Requirements

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To ensure good server performance, your system must meet the following hardware, operating system, Java runtime environment, and file descriptor limit requirements.

## Hardware Requirements

For optimal performance, your system must have sufficient RAM memory for the JVM heap and database cache. For more information on setting the JVM heap and database cache, see [“Configuring the JVM, Java Options, and Database Cache”](#) on page 19.

On Solaris systems, the operating system should be configured to have at least twice as much virtual memory as JVM heap. To achieve this, you might need to increase the size of the operating system swap space.

Your system should also have enough memory to store the generated log files. The directory server log files can consume up to 1 Gbyte of disk space with default server settings. In replicated environments, the change log database can grow up to 30-40 Gbytes with loads of 1000 mods/sec. For information on setting log file size, see [“Configuring Logs With dsconfig”](#) in *Sun OpenDS Standard Edition 2.0 Administration Guide*.

You can configure the directory server in such a way that it uses substantially less, or more, disk space depending on your application and performance needs. Any setup considerations must determine the amount of memory for the directory server’s database and log files.

As a general guideline, the following hardware is recommended:

Hardware Component	Requirement
RAM	<p><b>Evaluation purposes:</b> At least 256 Mbytes of free memory for a small database.</p> <p><b>Production:</b> Minimum of 2 Gbytes.</p> <p><b>Note</b> – For large databases that require more than 4 Gbytes of RAM, your system should use 64-bit architectures.</p>

Hardware Component	Requirement
Local disk space	<p><b>Evaluation purposes:</b> For a small database and sufficient space for log files, your system should have at least 100 Mbytes of free local disk space. Preferably, you should have at least 1 Gbyte of disk space.</p> <p><b>Production:</b> For a typical production deployment with a maximum of 250,000 entries and no binary attributes, such as images, 4 Gbytes of disk space might be sufficient for the database only. You might need an additional 1 Gbyte of disk space for log files. You need to determine disk space for the change log database (DB), which is dependent on the load (updates per second) and on the replication purge delay (that is, the time the server should keep information about internal updates). The change log DB can grow up to 30-40 Gbytes with loads of 1000 modifications per second.</p> <p><b>Note</b> – The directory server does not support databases and logs installed on NFS-mounted file systems. Sufficient space should be provided for the database on a local file system, for example, in <code>/var/opt</code> or <code>/local</code> on UNIX or Linux machines.</p>

## Supported Operating Systems

Sun OpenDS Standard Edition 2.0 is supported on the following systems.

TABLE 1 Supported Operating Systems

Operating System	Description
Solaris™ 10	SPARC® 64-bit, x86 and x64 architectures
OpenSolaris™ 2009.06	SPARC, x86 and x64 architectures
Microsoft® Windows® 2003 Server	for x86
Microsoft Windows 2008 Server	for x86 and x64 architectures
Red Hat® Linux® Advanced Server 5.3	for x86 and x64 architectures
SuSE® Linux Enterprise Server 10	for x86 and x64 architectures
Ubuntu® Linux 8.04	for x86 and x64 architectures
Sun Logical Domains (LDoms)	for SPARC processor-based systems running Solaris 10
VMWare® ESX Server™ 3.5	running Red Hat Linux 5.3 and Windows Server 2008 Enterprise

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**Note** – x64 refers to both Intel® 64 and AMD® 64.

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## Operating System Requirements

The following table outlines the operating system requirements.

Item	Requirement
Operating System TCP/IP Ports	<p>The directory server uses the following ports by default:</p> <ul style="list-style-type: none"> <li>▪ Administration connector, default port 4444</li> <li>▪ LDAP, default port 389</li> <li>▪ LDAPS, default port 636</li> <li>▪ SNMP, default port 161 if configured</li> <li>▪ JMX, default port 1689</li> <li>▪ Replication port 8989</li> </ul> <p><b>Note</b> – The ports can differ between root and non-root users for some protocols.</p>
File Descriptor Limits	<p>On some Linux systems, the default file descriptor limit is set to 1024. This value might be too small when processing the total number of client connections, database files, and log files that the directory server requires to operate. It is strongly recommended that this file descriptor limit be increased to 64K or (65536 file descriptors).</p>

## Java Requirements

The directory server requires that your system have an installed version of at least Java SE 5.0 (Sun version 1.5.0\_08) Java runtime environment (JRE). The preferred JRE is the latest version of Java SE 6.0. Java SE runtime environments for Solaris, Linux, and Windows systems are available online at the following web site: <http://java.sun.com/javase/downloads>.

Java Runtime Environment      Tested up to Version:

Sun JRE 1.5.0\_18 (32-bit and 64-bit)

Sun JRE 1.6.0\_14 (32-bit and 64-bit)

(Works best on the latest revision of Sun Java 6.0)

## Environment Variables

You must provide the directory server with information about the location of the Java installation that should be used by setting the `OPENDS_JAVA_HOME` environment variable. A potential problem could arise if the `OPENDS_JAVA_HOME` environment variable is not set, or does not point to the root of a valid (at least Java 5.0, JRE 1.5.0\_08) installation. Alternatively, using the `OPENDS_JAVA_BIN` variable to point to the absolute path of the Java executable may be helpful if you want to use a 64-bit JVM rather than the default 32-bit version (for example, `$JAVA/bin/sparcv9/java` or `$JAVA/bin/amd64/java`).

### ▼ To specify a JVM™ Installation for the Directory Server

- Specify a JVM installation for the directory server in one of the following ways:
  - Set the `OPENDS_JAVA_HOME` environment variable (with the JAVA installation path).

The directory server's administrative scripts uses the `OPENDS_JAVA_HOME` environment variable. If the variable is not set, an error can occur.
  - Set the `OPENDS_JAVA_BIN` environment variable (with the JAVA binary path).
    - Update the contents of the `lib/set-java-home` file (if it exists) with the correct value of the JAVA installation path.

## File Descriptor Requirements (Linux Systems)

To ensure good server performance, the total number of client connections, database files, and log files must not exceed the maximum file descriptor limit on the operating system (`ulimit -n`). By default, the directory server allows an unlimited number of connections but is restricted by the file descriptor limit on the operating system. Linux systems limit the number of file descriptors that any one process may open to 1024 per process. (This condition is not a problem on Solaris machines, x86, x64, or SPARC).

After the directory server has exceeded the file descriptor limit of 1024 per process, any new process and worker threads will be blocked. For example, if the directory server attempts to open a Oracle® Berkeley JE database file when the operating system has exceeded the file descriptor limit, the directory server will no longer be able to open a connection that can lead to a corrupted database exception. Likewise, if you have a directory server that exceeds the file descriptor limit set by the operating system, the directory server can become unresponsive as the LDAP connection handler consumes all of the CPU's processing in attempting to open a new connection.

To fix this condition, set the maximum file descriptor limit per process on Linux machines.

## ▼ To Increase the File Descriptor Limit (Linux)

### 1 Display the current hard limit of your machine.

The hard limit is the maximum server limit that can be set without tuning the kernel parameters in proc file system.

```
$ ulimit -aH
core file size (blocks)      unlimited
data seg size (kbytes)      unlimited
file size (blocks)          unlimited
max locked memory (kbytes)  unlimited
max memory size (kbytes)    unlimited
open files                   1024
pipe size (512 bytes)       8
stack size (kbytes)         unlimited
cpu time (seconds)          unlimited
max user processes          4094
virtual memory (kbytes)     unlimited
```

### 2 Edit the /etc/security/limits.conf and add the lines:

```
*      soft  nofile  1024
*      hard  nofile  65535
```

### 3 Edit the /etc/pam.d/login by adding the line:

```
session required /lib/security/pam_limits.so
```

### 4 Use the system file limit to increase the file descriptor limit to 65535.

The system file limit is set in /proc/sys/fs/file-max .

```
echo 65535 > /proc/sys/fs/file-max
```

### 5 Use the ulimit command to set the file descriptor limit to the hard limit specified in /etc/security/limits.conf.

```
ulimit -n unlimited
```

### 6 Restart your system.



# Installing the Directory Server

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The directory server is designed for easy downloading, installation, and configuration.

## Getting the Sun OpenDS Standard Edition Software

You can obtain the Sun OpenDS Standard Edition software by using one of the following methods:

- Download the software as a compressed archive (.zip) file from the [Sun OpenDS download site](#). The zip distribution is a stand-alone delivery method to install and to configure a Sun OpenDS Standard Edition directory server instance. The installation process of the directory server is very simple. Download the zip file, and then extract the contents of this zip file to the location where you want to install the server.
- Install the software from the Sun OpenDS Standard Edition Media Kit (part number: DSS99-200-9929). Copy the zip file from the Media Kit to a writable file system and extract the contents of the file to the location where you want to install the server.

### ▼ To Download the Sun OpenDS Standard Edition Software

- 1 Point your browser to the [Sun OpenDS download site](#).
- 2 Click Sun Download Gateway, and follow the instructions to save the zip file locally on your computer.

- 3 Unzip the zip compressed archive file.

```
$ unzip SunOpenDS_SE2.0.zip
```

If your system does not include a utility for extracting zip archives, you can use the jar tool provided with the Java environment.

```
$ jar -xvf SunOpenDS_SE2.0.zip
```

- 4 Change to the SunOpenDS\_SE2.0 subdirectory.

```
$ cd SunOpenDS_SE2.0
```

**5 View the contents of the SunOpenDS\_SE2.0 subdirectory.**

```
(UNIX, Linux)  $ ls
(Windows)     C:\> dir
Legal         bin                instance.loc      setup
QuickSetup.app changelogDb        ldif              setup.bat
README.txt    classes            legal-notices     snmp
Uninstall.app config              lib               uninstall
addons        db                  locks             uninstall.bat
bak           example-plugin.zip logs               upgrade
bat           import-tmp          resources         upgrade.bat
```

**▼ To Obtain the Sun OpenDS Standard Edition Software from the Media Kit****1 Insert the Media Kit CD into your cdrom drive.****2 Change to the CD directory.**

For example, assume that you have mounted your CD on /vol/cdrom on UNIX or Linux systems, or the E:\ drive on Windows systems.

```
(UNIX, Linux)  $ cd /vol/cdrom
(Windows)     C:\> E:
```

**3 The root directory of the CD contains the following files:**

```
(UNIX, Linux)  $ ls
(Windows)     E:\> dir
README.txt
Software_License_Agreement.txt
Sun OpenDS Standard Edition 2.0 Thirdpartylicensereadme.txt
SunOpenDS_SE2.0.zip
```

**4 Copy the zip file to a writable file system, for example:**

```
(UNIX, Linux)  $ mkdir /local/sunopends
                $ cd /local/sunopends
                $ cp /vol/cdrom/SunOpenDS_SE2.0.zip /local/sunopends

(Windows)     E:\> mkdir C:\sunopends
                E:\> C:
                C:\> cd sunopends
                C:\sunopends> xcopy E:\SunOpenDS_SE2.0.zip C:\sunopends
```

**5 Unzip the zip compressed archive file.**

```
$ unzip SunOpenDS_SE2.0.zip
```

If your system does not include a utility for extracting zip archives, you can use the jar tool provided with the Java environment.

```
$ jar -xvf SunOpenDS_SE2.0.zip
```

**6 Change to the SunOpenDS\_SE2.0 subdirectory.**

```
$ cd SunOpenDS_SE2.0
```

**7 View the contents of the SunOpenDS\_SE2.0 subdirectory.**

```
(UNIX, Linux)  $ ls
(Windows)     C:\> dir
Legal          bin                instance.loc      setup
QuickSetup.app changelogDb        ldif              setup.bat
README.txt     classes           legal-notices     snmp
Uninstall.app  config            lib               uninstall
addons         db                locks             uninstall.bat
bak            example-plugin.zip logs              upgrade
bat            import-tmp        resources         upgrade.bat
```

## Installing the Directory Server in a Solaris Zone

The directory server software treats global, full local, and sparse zones as an independent physical system. Installing the directory server in any type of Solaris zone is therefore like installing on an independent system. The software does not share services or file locations with other zones.

## Setting Up the Directory Server

You can set up the directory server in two modes:

- **Graphical user interface (GUI) mode.** GUI mode uses a Java-based graphical installer that enables you to set up the directory server, load it with data, and get it running in very little time. The installer asks some basic questions about the server configuration and then gives you the choice of leaving your database empty, loading the server with data from your own LDIF or loading the server with automatically generated sample data. The installer also enables you to configure security and replication, and, optionally, to start the server when the configuration is complete. Finally, the installer includes the ability to invoke the GUI control panel at the end of the configuration process.
- **Command-line mode.** The command-line mode prompts you for required information before the configuration begins.

## ▼ To Set Up the Directory Server in GUI Mode

- 1 **After you have unpacked the software, change to the installation subdirectory.**

```
(UNIX, Linux) $ cd SunOpenDS_SE2.0
(Windows)     C:\> cd SunOpenDS_SE2.0
```

- 2 **Type setup to configure the directory server installation.**

The utility launches the graphical installer.

```
(UNIX, Linux) $ setup
(Windows)     C:\> setup.bat
```

- 3 **On the QuickSetup Welcome panel, click Next.**

- 4 **On the License panel, select the checkbox to accept the license and click Next.**

- 5 **On the Server Settings panel, type the following information:**

- a. **Host Name. Type the directory server's host name or IP address.**

The default is the local host name.

- b. **LDAP Listener Port. Type the LDAP port for the directory server.**

If you run the installer as the root user, the default port is 389 . If you run the installer as a non-root user, the default port is 1389.

- c. **Administration Connector Port. Type the port that will be used for administration traffic.**

The default administration port is 4444. For more information, see [“Managing Administration Traffic to the Server”](#) in *Sun OpenDS Standard Edition 2.0 Administration Guide*.

- d. **LDAP Secure Access. If you want to configure SSL, StartTLS, or both, click Configure.**

Complete the following information:

- i. **SSL Access. Select Enable SSL and type a valid port for secure LDAP operations.**

If you run the installer as the root user, the default secure port is 636. If you run the installer as a non-root user, the default secure port is 1636.

- ii. **StartTLS Access. Click Enable StartTLS for LDAP.**

- iii. **Certificate. If you are in a testing environment, select Generate Self-Signed Certificate.**

For production servers, click Use an Existing Certificate, and then click the Keystore Type. Type the Keystore Path, and Keystore PIN if necessary.

- iv. **Click OK to continue.**
      - e. *Root User DN.* **Type the Root User DN, or keep the default, `cn=Directory Manager`.**
      - f. *Password.* **Type the root user bind password.**
      - g. *Password (confirm):* **Retype the root user bind password.**
      - h. **Click Next to continue.**
  - 6 **On the Topology Options panel, select one of the following:**
    - a. **This will be a stand-alone server.**
    - b. **This server will be part of a replication topology.**

For instructions on setting up a replicated topology, see [“Setting Up Replication During Installation”](#) on page 17.
  - 7 **Click Next to Continue.**
  - 8 **On the Directory Data panel, specify how to load data into your directory:**
    - a. *Directory Base DN.* **Type the base DN for your directory.**

The default Base DN is `dc=example,dc=com`.
    - b. **Directory Data. Select one of the data options.**
      - *Only Create Base Entry* **creates an entry with the base DN specified previously.**
      - *Leave Database Empty* **sets up a database but does not populate any entries.**
      - *Import Data from LDIF File* **imports LDIF data from the file specified in the Path field.**
      - *Import Automatically-Generated Sample Data* **generates the number of sample entries specified in the Number of User Entries field.**
  - 9 **On the Review panel, review your configuration.**

Click Start Server when Configuration has Completed to automatically start the server after the directory server has been configured. On Windows systems, click Start Server as a Windows service, if desired. Click Finish.
  - 10 **On the Finished panel, click Launch Control Panel to see the server configuration status and to perform basic administration tasks on the server,**

- 11 Click Close.

## ▼ To Set Up the Directory Server in Command-line Mode

- 1 After you have unpacked the software, change to the installation subdirectory.

```
(UNIX, Linux) $ cd SunOpenDS_SE2.0
(Windows)     C:\> cd SunOpenDS_SE2.0
```

- 2 Type `setup` with the `--cli` option to launch the command in interactive mode.

```
(UNIX, Linux) $ setup --cli
(Windows)     C:\> setup.bat -cli
```

- 3 Type Yes and press Enter to accept the license agreement.
- 4 Type the root user DN, or press Enter or Return to accept the default (`cn=Directory Manager`).
- 5 Provide a password for the root user and re-enter the password to confirm it.
- 6 Type the LDAP port number for your directory server, or press Enter or Return to accept the default.

If you run the installer as the root user, the default port is 389. If you run the installer as a non-root user, the default port is 1389.

- 7 Type the port number that will be used for administration traffic.

The default administration port is 4444. For more information, see [“Managing Administration Traffic to the Server”](#) in *Sun OpenDS Standard Edition 2.0 Administration Guide*.

- 8 Type the base DN for the directory data, or press Enter or Return to accept the default.

The default Base DN is `dc=example,dc=com`.

- 9 Type an option to set up the directory data.

- *Only create the base entry* creates an entry with the base DN specified previously.
- *Leave the database empty* sets up a database but does not populate any entries.
- *Import data from an LDIF file* imports LDIF data from a file, specified in the following step.
- *Load automatically-generated sample data* generates the number of sample entries specified in the following step.

- 10 **Type yes if you want to enable SSL and enter the port for LDAPS clients.**  
If you run the installer as the root user, the default secure port is 636. If you run the installer as a non-root user, the default secure port is 1636.
- 11 **Type yes if you want to enable StartTLS.**
- 12 **If you enabled SSL or StartTLS in the previous steps, select the certificate type.**
- 13 **Type yes or press Enter or Return to accept the default to start the server after the configuration has completed.**
- 14 **Confirm your configuration, and type 1 or press Enter or Return to accept the default to complete the configuration process.**

## Setting Up Replication During Installation

If you install the directory server by using the GUI, you can set up replication as part of the installation. If you install the server by using the command-line interface, you must set up replication by using the `dsreplication` command after the server is installed. For more information, see [“Configuring Replication With dsreplication”](#) in *Sun OpenDS Standard Edition 2.0 Administration Guide*.

### ▼ To Set Up Replication in GUI Mode

- 1 **For the first directory server in your replication topology, follow the instructions in [“To Set Up the Directory Server in GUI Mode”](#) on page 14.**
- 2 **On the Topologies screen, do following:**
  - a. **Select This server will be part of a replication topology.**
  - b. **Type the replication port number or accept the default port 8989.**

---

**Note** – The replication port must be different for each directory server in a topology if all of them are running on the same host.

---

- c. **Select Configure as Secure if you want to use encrypted communication when connecting to the replication port on the first server.**

---

**Note** – Record the replication port, host name, and administration port for this first directory server. You will need this information when you configure the second directory server.

---

- 3 Complete the configuration of the first server.**
- 4 If you are running the second directory server on the same host, unzip the Sun OpenDS Standard Edition software in a different subdirectory.**
- 5 Follow the instructions in [“To Set Up the Directory Server in GUI Mode” on page 14.](#)**
- 6 On the Topologies screen, do the following:**
  - a. Select This server will be part of a replication topology.**
  - b. Type the replication port number for this directory server.**

The replication port must be different from the replication port of the first directory server if both servers are running on the same host.
  - c. Select There is already a server in the topology.**
    - **Host Name.** Type the Host Name for the first directory server.
    - **Port.** Type the administration port for the first directory server.
    - **Admin User.** Type the bind DN for the first directory user, or accept the default.
    - **Admin Password.** Type a bind password for the Admin user.
- 7 On the Global Administrator screen, type a password for the Global Administrator for the replication servers.**
- 8 On the Data Replication screen, select one of the following options, and click Next.**
  - a. Create first instance of base DN to be replicated.**
  - b. Create local instance of existing base DN's and configure replication. Click the base DN for the first directory server.**
- 9 Review the configuration settings for the second server, and click Finish.**
- 10 Repeat these procedures to set up additional servers in the replication topology.**

# Configuring the JVM, Java Options, and Database Cache

---

The directory server and its command-line utilities run with a default Java Virtual Machine and with default Java arguments. To improve performance for your specific directory deployment, it might be useful to configure the JVM, Java options, and database (DB) cache (or caches).

## Configuring the Default JVM and Java Arguments

The directory server provides a means of configuring the Java Virtual Machine (JVM) and Java options for each command-line utility and for the directory server itself. The Java configuration is provided in a properties file, located at *install-dir/config/java.properties*. The configuration specified in this file is taken into account each time the `dsjavaproperties` command is run. If you do not run the `dsjavaproperties` command, the properties file is ignored.

The properties file can be used to specify (among other arguments) whether a command runs using the JVM in `-server` mode or `-client` mode. By default, all client applications run in `-client` mode, while the directory server and certain server utilities run in `-server` mode. Generally, `-server` mode provides higher throughput than `-client` mode, at the expense of slightly longer startup times.

For certain commands (`import-ldif`, `export-ldif`, `backup`, and `restore`) you can also specify different Java arguments (and a different JVM) depending on whether the command is run in online or offline mode.

### The Java Properties File Format

The Java properties file has the following format.

- `command-name.java-home=JVM-path`
- `command-name.java-args=JVM-arguments`

The following table shows three properties present in the `java.properties` file that are of particular importance.

Property	Description
<code>overwrite-env-java-home</code>	If this property is set to <code>true</code> , the system checks the <code>default.java-home</code> property in this properties file before the checking the <code>OPENDS_JAVA_HOME</code> environment variable. If this property is set to <code>false</code> , the system checks the <code>OPENDS_JAVA_HOME</code> environment variable first.
<code>overwrite-env-java-args</code>	If <code>True</code> , the system checks the <code>default.java-args</code> property in this properties file before the checking the <code>OPENDS_JAVA_ARGS</code> environment variable. If <code>false</code> , the system checks the <code>OPENDS_JAVA_ARGS</code> environment variable first.
<code>default.java-home</code>	Sets the JVM that will be used for the directory server and for all of its command-line utilities, unless a different JVM is specified for a particular utility.

---

## Configuring JVM Options

The following table summarizes the Java options that can have an impact on the performance of your directory server.

Condition	Option	Description
	<code>-server</code>	Selects server application runtime optimizations. The directory server will take longer to start and “warm up” but will be more aggressively optimized to produce higher throughput.
	<code>-d64</code>	For 64-bit machines only. By default, the directory server selects a 32-bit JVM regardless of the architecture. This options should be specified when a large JVM heap is required (greater than 4 Gytes) and the architecture is 64-bit.

---

Condition	Option	Description
	<code>-Xms2G -Xmx2G</code>	<p>Selects the initial and maximum memory sizes available to the JVM, respectively. These values are used for the JVM heap, which reserves memory for the directory server and its database (DB) cache (or caches if more than one). Increasing the amount of memory available can improve performance, but increasing it to too high a value can have a detrimental effect in the form of longer pauses for full garbage collection runs. Therefore, the initial and maximum sizes should be set to the same value. As a general guideline, take a look at the size of the Oracle Berkeley Java Edition (JE) database folders</p> <p>(<code>Sun-OpenDS-SE-installation-directory/db/userRoot</code>).</p> <p>Based on the folders' combined size, determine how much memory you want to reserve for the DB cache. After determining this value, tune the local DB back-end properties, <code>db-cache-percent</code> or <code>db-cache-size</code> and other JVM options appropriately. Be careful to allow additional memory for the Sun OpenDS SE runtime. For example, if you have a single database of 1 Gbyte, which you want to store entirely in memory, then a 2 Gbyte heap with 60% reserved for the DB cache should be sufficient for efficient directory server performance. You can test this setup by preloading the new database with the local database back end by using the <code>preload-time-limit</code> property.</p> <p>JVM heaps greater than 4 Gbytes require a 64-bit JVM.</p>
	<code>DisableExplicitGC</code>	<p>Prevents external applications from forcing expensive garbage collections. If you are using <code>jstatd</code> or other RMI-based applications to monitor the Sun OpenDS SE, you should consider using this option in order to avoid unexpected pauses.</p>
	<code>-XX:NewSize=512M</code>	<p>In heavy throughput environments, you should consider using this option to increase the size of the JVM young generation. By default, the young generation is quite small, and high throughput scenarios can result in a large amount of generated garbage. This garbage collection, in turn, causes the JVM to inadvertently promote short-lived objects into the old generation.</p>

Condition	Option	Description
Server Only	-XX:+UseConcMarkSweepGC	Selects the CMS garbage collector. This garbage collector is set for "low pause time". It will result in a Java application that has a lower average throughput, but much shorter CPU-intensive garbage collections. This option is required in environments that have response time constraints.
	-XX:CMSInitiatingOccupancyFraction=68	Selects the level at which the collection is started. The default value is 68%.
Offline Import Only	-XX:+UseParallelOldGC	Selects the parallel old generational garbage collector. This garbage collector is set for "high throughput". It will maximize the average throughput of the <code>import-ldif</code> utility at the cost of an occasional stop-the-world garbage collection, which is not as critical to imports.
	-XX:+PrintGCDetails	Prints the garbage collection details.
	-XX:+PrintGCTimeStamps	Prints the garbage collection time stamps to help with debugging.
Other Applications (for example, <code>dsconfig</code> )	-client	Selects client application run-time optimizations. The application will be faster to start and more responsive due to lower compilation overheads.
	-Xms8m	Selects a low initial JVM heap size for an application.

## ▼ To Specify the `JAVA_HOME` Environment Variable for a Specific Utility

- 1 **Edit the Java properties file as follows:** `command-name.java-home=jvm`.

For example, to specify that a JDK 1.6 be used for the offline import, edit the line that starts with `import-ldif.offline` in the `java.properties` file, as follows:

```
import-ldif.offline.java-home=/usr/jdk1.6.
```

- 2 **Run the `dsjavaproperties` command to apply the property.**

## ▼ To Specify the Java Arguments for a Specific Utility

- 1 **Edit the Java properties file as follows:** `command-name.java-args=arguments`.

For example, to specify that a maximum heap size of 256 Mbytes be used for the online export, edit the line that starts with `export-ldif.online` in the `java.properties` file, as follows:

```
export-ldif.online.java-args=-Xms256m -Xmx256m.
```

## 2 Run the `dsjavaproperties` command to apply the property.

### ▼ To Set the Database Cache

A critical component of your directory server's overall performance is the size of the database (DB) cache. You need to determine your particular memory settings depending on your hardware, the number of entries in your directory, and your performance requirements. For example, when importing data by using the `import -ldif` utility, you must configure the directory server in such a way to minimize and avoid potential data cache eviction problems. Ideally, you should set the DB cache to a value that ensures that the whole database can fit into the cache. For example, if you were importing 200K entries, you might specify 2 Gbytes for the JVM heap size, then allocate at least 1 Gbyte for the directory server runtime environment and the rest for the DB cache.

You can set the DB cache by configuring the `db-cache-percent` or the `db-cache-size` properties with the `dsconfig` command-line utility. The `db-cache-percent` and the `db-cache-size` properties represent the maximum size that the server can use for the DB cache. If the database is smaller than the size set by either of these properties, only the size of the database is allocated to the JVM heap.

Note that if you want to set the `db-cache-percent` property, then the `db-cache-size` property must be kept at the default value of 0 Mbytes. The `db-cache-size` property has precedence over the `db-cache-percent` property if both are given values.

- Use the `dsconfig` command to set the `db-cache-percent`.

This example sets the `db-cache-percent` to 50 percent. Thus, for a 2 Gbyte memory allocation, 1 Gbyte of memory will be allocated to the DB cache and the rest to the JVM.

```
$ dsconfig -h localhost -port 4444 -D "cn=Directory Manager" -w password -X -n \
  set-backend-prop --backend-name userRoot --set db-cache-percent:50
```

### ▼ To Configure Java Settings With the Control Panel

#### 1 Change to the appropriate directory.

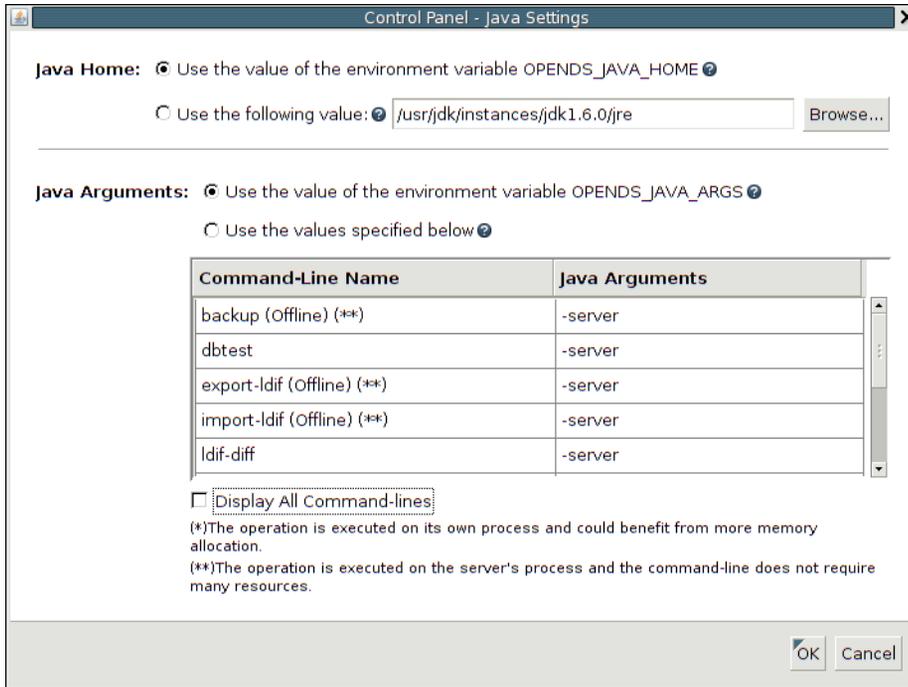
```
(UNIX, Linux) $ cd install-dir/bin
(Windows) C:\> cd install-dir\bat
```

#### 2 Type `control-panel` to open the control panel.

```
(UNIX, Linux) $ control-panel
(Windows) C:\> control-panel
```

#### 3 Click the Java Settings link under the Runtime Options menu on the left side of the Control Panel window.

In the Java Settings panel, a list of all directory server commands is displayed, in the left pane.



- 4 **To specify a path for the Java home directory, accept the default value specified by the OPENDS\_JAVA\_HOME environment variable, or select the Use the following value button and enter the path in its field.**

You can also click the Browse button to select a Java home directory from a list of directories.

If you specify that the directory server is to use OPENDS\_JAVA\_HOME and the directory server cannot access OPENDS\_JAVA\_HOME for any reason, it uses the path specified for the Java home directory. Similarly, if you specify an inaccessible path for the Java home directory, the directory server uses OPENDS\_JAVA\_HOME.

- 5 **To specify arguments for directory server commands, accept the default value specified by the OPENDS\_JAVA\_ARGS environment variable, or specify arguments for a particular command.**

To specify arguments for a particular command, select the command from the Command-Line Name column and edit the command's arguments in the Java Arguments column.

If you specify that the directory server should use the arguments in OPENDS\_JAVA\_ARGS and the directory server cannot access OPENDS\_JAVA\_ARGS for any reason, it uses the arguments specified in this window. Similarly, if you specify unusable arguments for a command, the directory server uses the values specified for the command in OPENDS\_JAVA\_ARGS.

- 6 **Click OK button to save your settings.**

# Upgrading the Directory Server

---

The directory server provides an upgrade mechanism that enables you to move an existing server instance to a later version. However, upgrading from Sun OpenDS Standard Edition 1.0 to Sun OpenDS Standard Edition 2.0 does not enable you to make use of all of the new features provided in the 2.0 release.

The current upgrade mechanism has the following behavior and limitations:

- Custom scripts and files are not preserved in the upgrade process. These scripts and files are moved to the *install-dir/history/timestamp* directory.
- Any customizations or modifications made to the configuration or to the schema must be migrated manually to the upgraded server instance.
- Database incompatibilities between Sun OpenDS Standard Edition 1.0 and Sun OpenDS Standard Edition 2.0 require that you rebuild all indexes when you export and re-import the data after an upgrade. For information about rebuilding the indexes, see “[rebuild-index](#)” in *Sun OpenDS Standard Edition 2.0 Command-Line Usage Guide*.
- Upgrading two 1.0 servers that are running on the same host is not supported.

If two servers are running on the same host, and both servers are upgraded using the upgrade command, the second server is upgraded but fails to start. This is because the upgrade automatically assigns an administration port of 4444 to both servers. If you must migrate two servers running on the same host, start the first server after the upgrade and, using `dsconfig`, change the administration port to something other than 4444, as follows:

```
$ dsconfig -D "cn=directory manager" -w password -n \  
  set-administration-connector-prop --set listen-port:5444
```

After changing the administration port on the first server, you will be able to start the second server with the default administration port.

- You cannot revert from Sun OpenDS Standard Edition 2.0 to any previous version.

Instead of upgrading, it is preferable to migrate existing server instances manually. If you choose to use the upgrade command, take note of the following steps:

- To move a standalone directory server to the latest version, stop the server, export the data to LDIF, use the upgrade command to change to the latest version, verify your configuration, ensure that the database on the upgraded server is removed, import the data from the exported LDIF, and then restart the server.
- To move an entire replicated topology of servers from 1.0 to 2.0, each server in the topology must be upgraded successively. Because some commands (such as `ds replication`) do not work properly in mixed topologies, you must complete the process on all servers in the topology as quickly as possible. After the change, verify that replication is working as expected.

# Starting and Stopping the Directory Server

---

This section provides information about starting and stopping the directory server and includes the following topics:

- [“Starting the Directory Server” on page 27](#)
- [“Stopping the Directory Server” on page 29](#)

## Starting the Directory Server

To start the directory server, run the `start-ds` command on UNIX or Linux systems or the `start-ds.bat` command on Windows systems. By default, the `start-ds` command starts the directory server as a background process when no options are specified. You can use the `start-ds` command with the `--nodetach` option to run the server as a foreground process. For more information, see [“start-ds” in \*Sun OpenDS Standard Edition 2.0 Command-Line Usage Guide\*](#).

The `start-ds` command automatically attempts to find the correct Java environment to use when starting the server. You can specify the path to the Java installation, and provide additional options directly to the JVM when the directory server is starting. For more information, see [“Configuring the Default JVM and Java Arguments” on page 19](#).

### ▼ To Start the Directory Server by Using `start-ds`

#### 1 Change to the appropriate directory.

```
(UNIX, Linux) $ cd install-dir/bin
(Windows)     C:\> cd install-dir\bat
```

#### 2 Type `start-ds`.

```
(UNIX, Linux) $ start-ds
(Windows)     C:\> start-ds
```

## ▼ To Start the Directory Server as a Foreground Process

### 1 Change to the appropriate directory.

```
(UNIX, Linux) $ cd install-dir/bin  
(Windows)     C:\> cd install-dir\bat
```

### 2 Type `start-ds` with `-N` or `--nodetach`.

```
(UNIX, Linux) $ start-ds --nodetach  
(Windows)     C:\> start-ds --nodetach
```

You can stop the directory server by pressing `Control-C` in the terminal window in which the server is running or by running the `stop-ds` utility from another window.

## ▼ To Start the Directory Server by Using the Control Panel

### 1 Change to the appropriate directory.

```
(UNIX, Linux) $ cd install-dir/bin  
(Windows)     C:\> cd install-dir\bat
```

### 2 Type `control-panel` to open the GUI control panel.

```
(UNIX, Linux) $ control-panel  
(Windows)     C:\> control-panel
```

### 3 On the Server Status panel, click **Start**.

## ▼ To Restart the Directory Server

### 1 Change to the installation directory.

```
(UNIX, Linux) $ cd install-dir/bin  
(Windows)     C:\> cd install-dir\bat
```

### 2 Type `stop-ds` with `-R` or `--restart`.

```
(UNIX, Linux) $ stop-ds --restart  
(Windows)     C:\> stop-ds --restart
```

## ▼ To Restart the Directory Server by Using the Control Panel

### 1 Change to the appropriate directory.

```
(UNIX, Linux) $ cd install-dir/bin  
(Windows)     C:\> cd install-dir\bat
```

- 2 **Type `control-panel` to open the GUI control panel.**

```
(UNIX, Linux) $ control-panel
(Windows)    C:\> control-panel
```

- 3 **On the Server Status panel, click Restart.**
- 4 **In the Confirmation dialog, click Yes.**

### ▼ **To Start the Directory Server by Using a Script (UNIX/Linux)**

The `start-ds` command provides a “quiet” option ( `-Q` or `--quiet`) that suppresses output during the startup process unless a significant error occurs. You can use this option in a startup script.

- 1 **Create a shell script and add the following `start-ds` command.**

```
install-dir/bin/start-ds --quiet
```

- 2 **Run the script.**

## Stopping the Directory Server

On any system (whether the directory server is running in the foreground or the background), or even from a remote system, you can stop the server using one of the following methods. For more information about the `stop-ds` command, see “[stop-ds](#)” in *Sun OpenDS Standard Edition 2.0 Command-Line Usage Guide*.

### ▼ **To Stop the Directory Server by Using `stop-ds`**

- 1 **Change to the appropriate directory.**

```
(UNIX, Linux) $ cd install-dir/bin
(Windows)    C:\> cd install-dir\bat
```

- 2 **Type `stop-ds`**

```
(UNIX, Linux) $ stop-ds
(Windows)    C:\> stop-ds
```

### ▼ **To Stop the Directory Server by Using the Control Panel**

- 1 **Change to the appropriate directory.**

```
(UNIX, Linux) $ cd install-dir/bin
(Windows)    C:\> cd install-dir\bat
```

- 2 **Type `control-panel` to open the GUI control panel.**

(UNIX, Linux) `$ control-panel`  
(Windows) `C:\> control-panel`

- 3 **On the Server Status panel, click Stop.**
- 4 **On the Confirmation dialog, click Yes.**

### ▼ **To Stop the Directory Server that is Running in the Foreground**

This procedure assumes that the directory server is running as a foreground process (using the `-N` or `--nodetach` option).

- **Type Control-C in a terminal window on UNIX or in the Command Prompt window on Windows systems to stop the server.**

Alternatively, run the `stop-ds` command from another window.

### ▼ **To Stop the Directory Server by Using a Script (UNIX/Linux)**

The `stop-ds` command provides a “quiet” option (`-Q` or `--quiet`) that suppresses output during the stopping process unless a significant error occurs. You can use this option in a shutdown script.

- 1 **Create a shell script and add the following `stop-ds` command.**

```
install-dir/bin/stop-ds --quiet
```

- 2 **Run the script.**

# Managing the Directory Server as a Service

---

This section includes the following topics:

- [“Managing the Directory Server as a Windows Service” on page 31](#)

## Managing the Directory Server as a Windows Service

Use the `windows-service` command to enable or disable the directory server as a Windows service. For more information, see “`windows-service`” in *Sun OpenDS Standard Edition 2.0 Command-Line Usage Guide*.

### ▼ To Enable the Directory Server as a Windows Service

- Use the `windows-service` command, as follows:

```
C:\> windows-service -e
```

### ▼ To Disable the Directory Server as a Windows Service

- Use the `windows-service` command, as follows:

```
C:\> windows-service -d
```

### Configuring the Timeout Value When the Server Starts

If the system is heavily loaded when it boots, the process that starts the directory server might time out while waiting for the server to start. By default, the server attempts to start 100 times, with an interval of 5 seconds between attempts.

You can configure the number of attempts that the server makes to start by setting the value of the `OPENDS_WINDOWS_SERVICE_START_NTRIES` system environment variable.



# Uninstalling the Directory Server

---

You can uninstall the directory server using one of the following modes:

- **Graphical user interface (GUI) mode.** GUI mode is the default and recommended uninstall option. The GUI provides an easy interface for removing a directory server installation.
- **Interactive command-line mode.** Interactive command-line mode prompts the user for required information before the uninstall begins and is started by using the `--cli` option. If `uninstall --cli` requires more input, then the `uninstall` utility prompts the user for the input and does not exit.
- **Quiet uninstall mode.** Quiet uninstall mode suppresses progress information to standard output during processing, except for fatal errors. This mode is convenient for scripting with the `--no-prompt` and `--quiet` options.

For more information about the `uninstall` command, see “[uninstall](#)” in *Sun OpenDS Standard Edition 2.0 Command-Line Usage Guide*.

## ▼ To Uninstall the Directory Server in GUI Mode

1 **Open a terminal window, and change to the installation subdirectory.**

2 **Type `uninstall` to remove your directory server.**

The utility launches the graphical uninstaller.

```
(UNIX, Linux) $ uninstall  
(Windows) C:\> uninstall.bat
```

3 **Clear any components that you want to remove, confirm that you want to delete them, and click **Uninstall**.**

---

**Note** – By default, all components are selected for removal.

---

4 **If your directory server is part of a replication topology, click **Yes** to continue the uninstallation.**

The uninstaller starts the server (if it is not already running) and asks you for your Global Administrator login to remove the references to this server in the other replicating directory servers.

- 5 **If your directory server is a stand-alone server and is running, a dialog box is displayed, asking to shut down the directory server before continuing with the uninstall.**

Click Yes to have the uninstaller stop the server for you and continue with the uninstallation.

- 6 **On the dialog, make note of any files or directories that require manual removal and click Close.**

- 7 **Review the logs to confirm the file or directory removals. Unix logs the entries at `/var/tmp`, Linux at `/tmp`, and Windows in the location defined by the `TEMP` user environment variable.**

Log files are listed as `opens -install -IDNumber.log`, where *IDNumber* is a system-generated number for your log.

- 8 **Manually remove any remaining files or directories.**

- 9 **For Windows systems, check the Windows registry for any remaining keys ending with `OpenDS`. For example:**

```
SYSTEM\\CurrentControlSet\\Services\\EventLog\\Application\\OpenDS
```

- 10 **Locate the `SunOpenDS_SE2.0` directory, and manually remove the directory and its subdirectories.**

```
(UNIX, Linux) $ rm -ir SunOpenDS_SE2.0
```

```
(Windows) C:\> rmdir /s /q C:\path\to\SunOpenDS_SE2.0
```

## ▼ To Uninstall the Directory Server by Using the Command Line

- 1 **Use the `uninstall` command with the `--cli` option.**

```
(UNIX, Linux) $ uninstall --cli
```

```
(Windows) C:\> uninstall.bat --cli
```

- 2 **Select the components to be removed.**

If you want to remove all components, press Enter or Return to accept the default.

Do you want to remove all components of OpenDS or select the components to remove?

- 1) Remove all components
- 2) Select the components to be removed

q) quit

Enter choice [1]:

**3 If your directory server is part of a replication topology, type Yes or press Enter or Return to continue the uninstallation.**

The uninstaller starts the server (if it is not already running) and requests your Global Administrator login to remove the references to this server in the other replicating directory servers.

This server is configured to do replication.

If the server is actually replicating contents with other servers you must provide administrator authentication to remove references to this server in the replicating OpenDS servers.

Type 'Yes' to provide authentication to remove the remote references.

Type 'No' to continue the uninstall without updating remote references.

Provide authentication? (yes / no) [yes]:

# Type your Global Administrator user ID, password, and host of the directory server as it is referenced in other replication servers.

Global Administrator User ID [admin]:

Password for user 'admin':

The name of this host (or IP address) as it is referenced in remote servers for replication [srl-uas-01]:

**4 Remove any folders manually if present.**

Removing references on srl-uas-01:2389 ..... Done.

Stopping Directory Server ..... Done.

Deleting Files under the Installation Path ..... Done.

OpenDS Uninstall Completed Successfully.

To complete the uninstallation, you must delete manually the following files and directories:

/home/sunopends/opends/ds-server-1/lib

See /var/tmp/opends-uninstall-2085.log for a detailed log of this operation.

**5 If your directory server is a stand-alone server and is running, it prompts you to stop the server, press Enter or Return to accept the default (Yes).**

The OpenDS server is currently running and must be stopped before uninstallation can continue.

Stop the Server and permanently delete the files? (yes / no) [yes]:

Stopping Directory Server ..... Done.

Deleting Files under the Installation Path ..... Done.

OpenDS Uninstall Completed Successfully.

To complete the uninstallation, you must delete manually the following files and directories:

/home/sunopends/standalone/ds-server-test/lib

See `/var/tmp/opens-uninstall-16565.log` for a detailed log of this operation.

**6 If you want to remove certain components and keep the others, type 2.**

**7 When `uninstall` prompts you to select the components to be deleted, press Enter or Return to accept the defaults.**

```
Do you want to remove all components of
OpenDS or select the components to remove?
```

- 1) Remove all components
- 2) Select the components to be removed
  
- q) quit

```
Enter choice [1]: 2
```

```
Remove Server Libraries and Administrative Tools? (yes / no) [yes]:
Remove Database Contents? (yes / no) [yes]:
Remove Log Files? (yes / no) [yes]:
Remove Configuration and Schema Files? (yes / no) [yes]:
Remove Backup Files Contained in bak Directory? (yes / no) [yes]:
Remove LDIF Export Files Contained in ldif Directory? (yes / no) [yes]:
```

```
The OpenDS server is currently running and must be stopped before
uninstallation can continue.
```

```
Stop the Server and permanently delete the files? (yes / no) [yes]:
```

```
Stopping Directory Server ..... Done.
Deleting Files under the Installation Path ..... Done.
```

```
OpenDS Uninstall Completed Successfully.
```

```
To complete the uninstallation, you must delete manually the following files
and directories:
```

```
/home/opens/standalone/ds-server-test/lib
```

```
See /var/tmp/opens-uninstall-7470.log for a detailed log of this operation.
```

**8 If you want to quit the uninstaller without removing files, type q. The `uninstall` utility quits the process and logs the entry.**

---

**Note** – UNIX logs the entry at `/var/tmp`, Linux at `/tmp`, and Windows at the location defined by the `TEMP` user environment variable.

---

```
(UNIX, Linux) $ uninstall --cli
```

```
(Windows) C:\> uninstall.bat --cli
```

```
Do you want to remove all components of OpenDS or select the components to
```

remove?

- 1) Remove all components
- 2) Select the components to be removed
  
- q) quit

Enter choice [1]:

See `/var/tmp/opens-uninstall-24340.log` for a detailed log of this operation.

**9 Check that all files and directories have been removed. If they have not been removed, manually remove them.**

**10 For Windows systems, check the Windows registry for any remaining keys ending with OpenDS. For example:**

```
SYSTEM\CurrentControlSet\Services\EventLog\Application\OpenDS
```

**11 Locate the `SunOpenDS_SE2.0` directory, and manually remove the directory and its subdirectories.**

```
(UNIX, Linux) $ rm -ir SunOpenDS_SE2.0
```

```
(Windows) C:\> rmdir /s /q C:\path\to\SunOpenDS_SE2.0
```

## ▼ To Uninstall the Directory Server by Using a Script (UNIX/Linux Only)

The `uninstall` command provides two options, `--quiet` and `--no-prompt`, for simple scripting. Most directory administrators have their preferred scripting language for automating their system tasks. The directory server provides script-friendly options with its command-line utilities to facilitate quick coding.

**1 Create an uninstallation script and add the following `uninstall` command.**

Make sure to type the command on a single line.

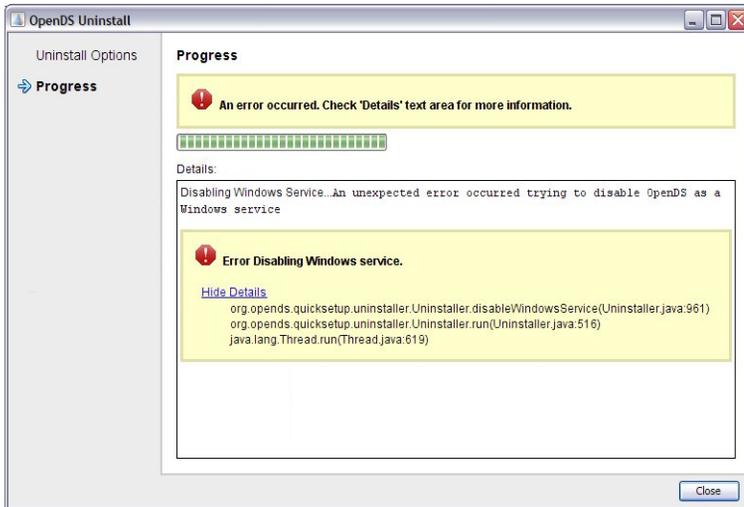
```
install-dir/uninstall --cli \  
--remove-all --no-prompt --forceOnError --quiet
```

**2 Run the script.**

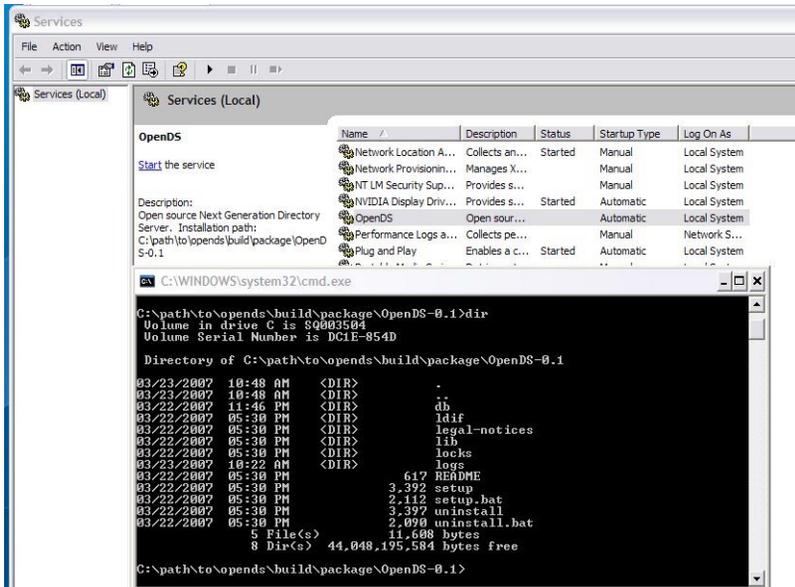
**3 Check for remaining directories in the logs, and if any directories or files remain, manually delete them.**

## Removing the Directory Server Windows Service

The uninstaller can, in most cases, cleanly uninstall and remove the directory server from your system. However, for Windows platforms, there might be times when the uninstaller fails to remove files due to an active directory server Windows service. For example, the `uninstall` utility might display the following error message.



In this case, the uninstaller failed due to the presence of the Windows service in the service manager, which prevents the uninstaller from deleting all of the instance's directories. As a result, the Windows service still remains even though the uninstaller has removed some files and directories from the instance server. For example, the `bin` directory is missing after a failed uninstallation, while other directories have been removed.



You have two options to remove the remaining Windows service:

- Use the `windows-service.bat` utility to clean up the existing service.
- Manually remove the Windows service in the Windows registry.

### ▼ To Remove a Windows Service by Using `windows-service.bat`

You can use the `windows-service.bat` command to clean up any existing Windows services. This command is located in `install-dir\bat`.

#### 1 Use the `windows-service.bat` command with the `--cleanupService` option.

Type the `serviceName` that you want to remove.

```
C:\> windows-service --cleanupService serviceName
```

#### 2 Restart Windows to complete the cleanup.

---

**Note** – This command only removes directory server services. The command will not clean up another product's services.

---

### ▼ To Manually Remove the Directory Server Service From the Windows Registry

You can manually remove any remaining Windows service entries from the Windows registry.



---

**Caution** – Make sure you know what you are doing when removing entries in your Windows registry. You can permanently damage your operating system.

---

**1** Run the Task Manager, click on its Processes tab, and make sure that `opens_service.exe` is not running. If it is, select the process and click the End Process button at the bottom right of the Task Manager dialog.

**2** Run `regedit` and go down the registry tree following this path.

My Computer->HKEY\_LOCAL\_MACHINE->SYSTEM->CurrentControlSet->Services->OpenDS

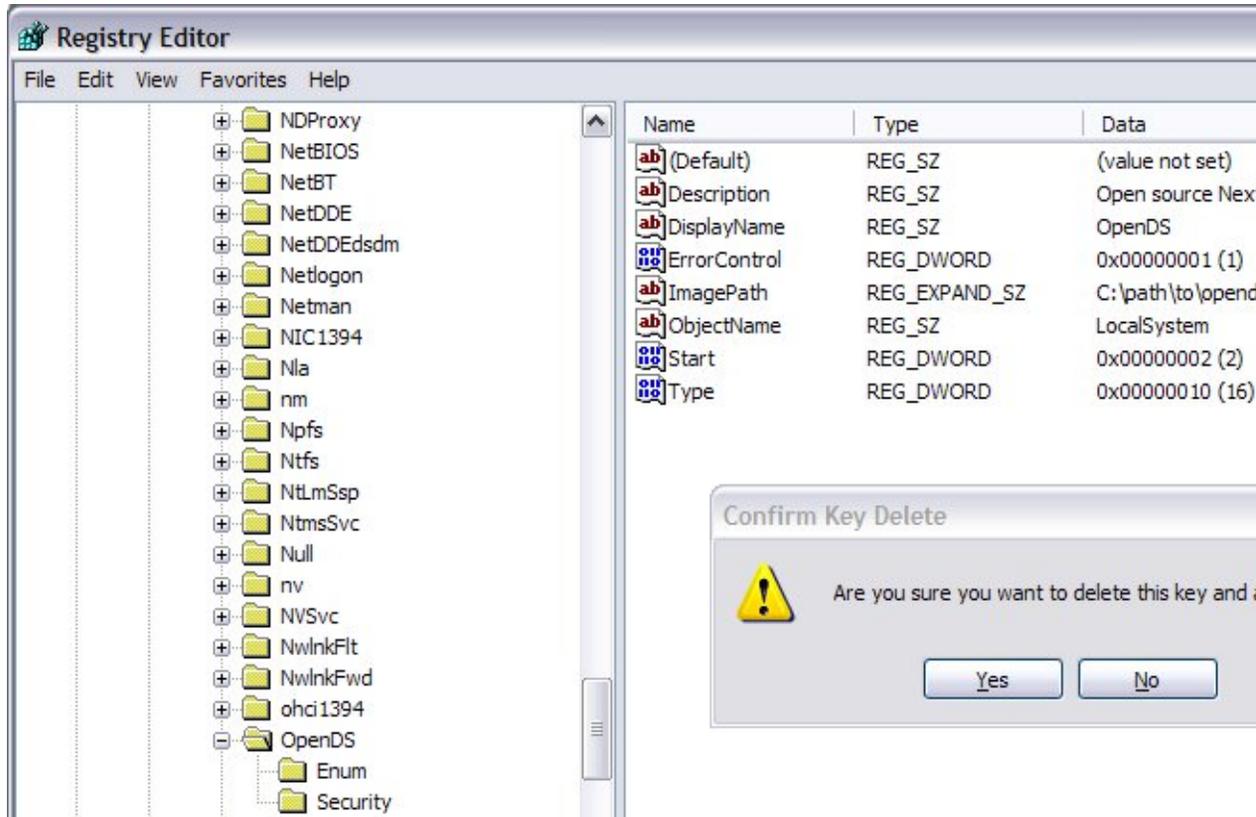
---

**Note** – If you installed more than one instance of OpenDS, the added services are named OpenDS-2, OpenDS-3, and so on.

---

**3** Make sure to check which instance the service that you are about to remove points to.

**4** Delete the entry from the Registry.

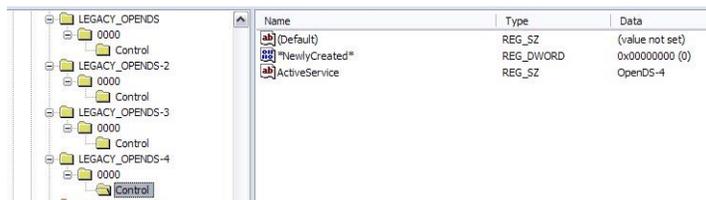


**5 Search the registry for LEGACY\_OPENDS control sets that might be saved in other control sets.**

Search the following:

HKEY\_LOCAL\_MACHINE->SYSTEM->ControlSetxyz->Enum->Root->LEGACY\_OPENDS-w

where w is the number of Sun OpenDS™ Standard Edition instances that you have registered as a service and xyz is the number of configuration profiles saved on the machine. This entry is typically found in ControlSet001, but it can be located elsewhere.



Depending on your profile, your system configuration, and the control set you are trying to edit, the registry entries may be protected from deletion. In this case, it could indicate that you need Administrator privileges to do this operation or that the system control set will be refreshed the next time Windows starts up successfully, and thus confirming that the current configuration is valid.

**6 Delete the instance directory to make sure you have completely uninstalled the directory server.**

**7 Restart Windows.**

The Windows service should be removed.