ENVI SERVICES ENGINE

ENVI Services Engine 5.3 Installation Guide

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Before You Begin

ESE runs on Windows and Linux 64-bit systems:

Platform	Operating System	Hardware	Supported Versions
Windows		Intel/AMD 64-bit	7, 8, Server 2008, 10
UNIX	Linux	Intel/AMD 64-bit	Kernel 2.6.32, glibc 2.12, GTK+ 2.4.13

The Admin Console works with Google Chrome and Mozilla Firefox browsers. The ESE Help requires an HTML5-compatible browser.

Before installing ESE, here are some questions to consider:

- Will you install ESE on a single machine or a cluster? If you install on a cluster, the ESE_WORK_DIR will need to be accessible to all machines.
- How does ESE fit into the overall system or network?
- What other software is going to run on the system where ESE resides?
- Do you need to limit ESE so it doesn't use the entire node or cluster?
- Will ESE be the only process running on the nodes? This is important for picking the numbers of workers, etc.
- Where is the data located? Ideally, the data should be local to the processing ("bring processing to the data") to minimize network traffic and maximize performance.
- What kind of processing will the system need to run? Will you need to optimize your disks before installing ESE?
- Who will be using the system, and what user account will run ESE? Make sure to have the ESE user account set up before attempting installation. The user account should be set up with its own password; a blank password or no password will not work with ESE.

Finally, you should locate a suitable disk for the `ESE_WORK_DIR` folder structure. Ideally, this should be a disk with high read and write speeds.

Windows Considerations

Windows needs a local installation of IDL and ENVI on each worker node.

ENVI LiDAR is only supported on Windows platforms.

ENVI for ArcGIS® - Services Edition (EFASE) is only supported on Windows 64-bit platforms.

If ArcGIS for Server software is installed on a separate system from ESE, follow the instructions in ArcServer Host and ESE on Different Systems.

Linux Considerations

One installation of IDL and ENVI is sufficient for the entire cluster, if you are using a clustered environment.

You should decide whether to install ESE as an application or daemon. See the Linux Installation Instructions for details.

Windows Installation Instructions

You must have administrator privileges to install ESE on Windows.

1. Insert the installation disk in the appropriate drive. The autorun program should start automatically. If the autorun program does not start, select **Start** > **Run**. In the Run dialog, click **Browse** to navigate to the drive, select `autorun.exe`, and click **OK**.
2. Click the **Install** button. If you do not already have IDL and ENVI installed, you will be prompted to install them.
3. Select the **ENVI for ArcGIS - Services Edition** option to install ESE along with ENVI for ArcGIS - Services Edition (EFASE). This is for Windows 64-bit systems only. Refer to the EFASE Installation Guide PDF (included with the installation disk or web download) for further details. Otherwise, select the **ENVI Services Engine** option to only install ESE.
4. Choose whether or not to install ESE as a *service* so that it will run as a background process that performs without any user interaction:
   - **Yes, setup the service to start automatically:** Select this option to automatically start the ESE service after a system reboot. This option is convenent for clustered environments with numerous machines.
   - **Yes, setup the service to start manually:** Select this option to manually control when the ESE service runs. See Stop and Start the System for instructions on manually stopping and starting the ESE service after installation.
   - **No:** Choose this option if you will run ESE as an application rather than as a service. See Start ESE As An Application for instructions after installation is complete.
5. If you selected to start the service automatically or manually, you are prompted to enter a **User name** and **Password**. The user account must have a password; a blank password or no password will not work with ESE. Click the **New User Information** button to establish a new user account if needed. Install as a user with restricted privileges because this type of installation poses security hazards. This is because ESE runs with the same permissions as the specified user, including the ability to delete and modify directories and files.
6. Choose the work directory location. The default folder is `C:\Exelis`. Click **Next**.
7. When the installation is complete, you can optionally run the License Wizard. If you choose not to run the License Wizard now, click **No**.

- To run the License Wizard after installation, select **Start** > **Programs** > **ENVI x.x** > **Tools** > **License Wizard**. Follow the screens to point to a valid license server or to install a license file.
- You can also copy the `license.dat` file to the folder on your machine that contains the installation files for IDL and/or ENVI. The default location is `C:\Program Files\Exelis\License`.
- See Licensing Overview for a description of different license types in ESE.

Start ESE as an Application

You may want to run ESE as an application if you need to debug its installation or are developing new tasks for the server. When running as an application, the console window displays the error messages directly which can help during the debugging process. However, the same error messages are available via the log files as well.

If you would like to start ESE as an application on Windows, follow these steps:

1. Open a command prompt by navigating to: **Start > All Programs > Accessories > Command Prompt** or type `cmd.exe` from the Start menu's search text box.
2. In the Command Prompt window, type: `cd C:\Program Files\Exelis\IDL`*xx*`\bin\bin.x86_64` and press the **Enter** key.
3. Then type: `EnviServicesEngine.exe -d`

ESE should now be running as an application.

To stop ESE as an application, type **Ctrl+C** at the command line.

Linux Installation Instructions

You can install ESE on a local machine, on a network file system (NFS), or a distributed file system (DFS).

If you want to try out ESE to see how it works, or to author and test tasks, consider installing on a local machine, not as `root`. See Install ESE as an Application for instructions. You can install locally without `root` privileges. Non-`root` users do not have service logon rights, so you will need to manually start the service.

If you want to run ESE in a production environment, then consider installing it as a daemon running under a user with limited permissions. See Install ESE as a Daemon for instructions.

Install ESE as an Application

The installer will ask you to specify a location to install ENVI+IDL and a writeable location for ESE work files, such as the job database, job sandbox directories, uploaded tasks, etc.

1. Log in to your system with the user account under which you want to run ESE. For personal use this can be your regular user account.
2. Mount the ESE installation DVD.
3. Enter the following command at your shell prompt, where DVD-PATH is the path to your DVD drive:
   `/bin/sh /DVD-PATH/install.sh`
4. Follow the prompts to install the software.
5. When the installation is complete, you can optionally run the License Wizard. If you choose not to run the License Wizard now, click **No**.
   - To run the License Wizard after installation, go to the installation path and typing `exelislicense` at the shell prompt. The default location is `/usr/local/exelis/bin`.
   - See Licensing Overview for a description of different license types in ESE.

Start ESE as an Application

Enter the following commands at a shell prompt to source and start ESE as an application. The <*nn*> refers to the version of ESE:

```
% cd /se<nn>/bin
% source ese_setup
% EnviServicesEngine
```

ESE will not start if it is not properly licensed. Check the `/se<nn>/logs` folder for details if it does not start.

By default, ESE will create half as many worker processes as there are CPUs on the machine. You can view them in the Admin Console. Open a browser and type in the location:

`http://<hostname>:<port>/ese/admin`

Select the Nodes tab to view the nodes and their worker processes.

Install ESE as a Daemon

Installation as a daemon can be on a single machine or on a network or distributed file system. The latter is recommended when deploying the service across multiple machines. Installing ESE in a clustered environment requires `root` privileges during installation, and also a unique user with restricted privileges.

Even though you would install with `root` privileges, we recommend running ESE under a specific user account in order to take advantage of your inherent system-supplied security settings. Note that ESE runs with the same permissions as the specified user, including the ability to delete and modify directories and files. Running ESE under a specific user account allows it to have permission to modify and delete ESE files but not system files.

Another thing to note when installing ESE as `root`: the `root` user has service logon rights. Because of this, if you install ESE as `root`, the daemon can be configured to start automatically as the system boots.

1. Log in to your system as a user with `sudo` privileges.
2. Create a user account that the ESE daemon will run as. All ESE processes will run as this user and hence have its privileges. This should be an account with limited and well-understood privileges. This user account will need write access to an ESE working directory, which by default is `/home/<user>/exelis/se<nn>`.
3. Mount the ESE installation DVD.
4. Enter the following command at your shell prompt, where DVD-PATH is the path to your DVD drive:
   `/bin/sh /DVD-PATH/install.sh`
5. Follow the prompts to install the software.
6. When the installation is complete, you can optionally run the License Wizard. If you choose not to run the License Wizard now, click **No**.

- To run the License Wizard after installation, go to the installation path and typing `exelislicense` at the shell prompt. The default location is `/usr/local/exelis/bin`.
- See Licensing Overview for a description of different license types in ESE.

Starting the ESE Daemon on Other Nodes

On a cluster of machines, you should start the service on one or more machines besides the master. Issue the following commands on each machine to install or start the daemon and to set up the appropriate service links:

The commands vary between Red Hat and Debian (Ubuntu). Note that <*nn*> is the current, installed version of ESE on your system.

Red Hat:

```
% cd <ESE_WORK_DIR>/exelis/se<nn>/bin
% sudo ./ese-install-initd -u <user>
% sudo /sbin/service ese start
```

Ubuntu:

```
% cd <ESE_WORK_DIR>/exelis/se<nn>/bin
% sudo ./ese-install-initd -u <user>
% sudo /usr/sbin/service ese start
```

The following directories are involved with installation of the daemon:

`/usr/local/exelis`	Possible ESE installation location.
`/etc/init.d`	Linux daemons are configured via files and symbolic links in these locations.
`/etc/rc.d/rc#.d`	

Uninstalling ESE from Linux RedHat Systems

This section pertains to RedHat, Fedora, CentOS, and similar Linux operating systems.To uninstall the daemon, issue the following commands.

1. First, stop the daemon:
   ```
   % sudo /sbin/service ese stop
   ```
2. Remove the links:
   ```
   % sudo /sbin/chkconfig --del ese
   ```

   For RedHat, use:
   ```
   % sudo /sbin/chkconfig --delete ese
   ```

3. Remove ESE daemon script from the init.d directory:
   `% sudo rm /etc/init.d/ese`

After these steps, you can still manually run ESE as an application by running the `EnviServicesEngine` script. The daemon can be set up again by running the `ese-install-initd` script that is in the *<EXELIS_WORK_DIR>*`/se`*<nn>*`/bin` directory (where *<nn>* is the current, installed version of ESE).

To fully uninstall ESE, issue the following commands:

1. Remove the directory where IDL, ENVI and other products are installed:
   `% sudo rm -rf /usr/local/exelis`
2. Remove the ESE_WORK_DIR:
   `% sudo rm -rf /home/<user>/exelis`

Note: These steps will delete the jobs database and all tasks that have been uploaded. If you want to keep the tasks, copy the *<EXELIS_WORK_DIR>*`/se`*<nn>*`/tasks` folder to a safe location before uninstalling ESE.

Uninstalling ESE from Debian Linux Systems

These steps pertain to Ubuntu and similar Linux operating systems.

1. First, stop the daemon:
   `% sudo /usr/sbin/service ese stop`
2. Remove the links.
   `% sudo /usr/sbin/update-rc.d -f ese remove`
3. Remove ESE from the the init.d directory:
   `% sudo rm /etc/init.d/ese`

After these steps, you can still manually run ESE as an application by running the `EnviServicesEngine` script. The daemon can be setup again by running the `ese-install-initd` script that is in the *<EXELIS_WORK_DIR>*`/se`*<nn>*`/bin` directory (where *<nn>* is the current, installed version of ESE).

To fully uninstall ESE, issue the following commands:

1. Remove the directory where IDL, ENVI, and other products are installed:
   `% sudo rm -rf /usr/local/exelis`
2. Remove the ESE_WORK_DIR:
   `% sudo rm -rf /home/<user>/exelis`

Note: These steps will delete the jobs database and all tasks that have been uploaded. If you want to keep the tasks, copy the *<EXELIS_WORK_DIR>*`/se`*<nn>*`/tasks` folder to a safe location before uninstalling ESE.

Installation Components

This topic presents some basic information about ESE's installed components and their locations on disk. The installation process for ESE creates two separate directories: one holds the IDL and ENVI installations as well as the ENVI Services Engine executable; the other directory contains the `ESE_WORK_DIR` and related files.

IDL and ENVI Directories

The IDL/ENVI directory structure contains the program, help, and example files for IDL and ENVI, as well as the license directory for all Exelis VIS products including IDL, ENVI, and ESE. Additionally, it contains the ESE executable, which is necessary to start ESE as an application. The permissions on this directory structure may be restricted with no write access.

The location of the IDL/ENVI directory depends on the operating system:

Linux: You can choose a new location during installation, but the default location is `/usr/local/exelis`.

Windows: Chosen during installation, but the default location is `C:\Program Files\Exelis`.

ENVI Services Engine Executable

By default, the ESE executable resides in the following folder:

- Linux (script): `<IDL_INSTALL_DIR>/bin`. The script is `EnviServicesEngine`. It sets up the environment before calling the executable.
- Linux (executable): `<IDL_INSTALL_DIR>/bin/bin.linux.x86_64`. The executable is `EnviServicesEngine`.
- Windows: `<IDL_INSTALL_DIR>\idl`*xx*`\bin\bin.x86_64`. The executable is `EnviServicesEngine.exe`.

ESE_WORK_DIR

The `ESE_WORK_DIR` is a user-writable directory structure and contains the ESE support files, help and example files, and the `bin`, `docroot`, `logs`, `lib`, and `tasks` directories. The installation process places the `ESE_WORK_DIR` in a separate location from the ESE, IDL, and ENVI executables.

Linux Clustered Environment: Both the IDL and ENVI directories, as well as <ESE_WORK_DIR> should be on a network location. If a drive letter is necessary, creating a directory symbolic link will also work. See Knowledge Base for more information.

Windows Clustered Environment: Choose a location on a network or shared drive using a UNC syntax.

The following directories are installed below ESE_WORK_DIR:

Bin

This directory contains the ESE configuration file (server.cfg), scripts for setting up ESE, as well as Linux scripts to run ESE as a daemon.

Docroot

This directory contains:

- The web server's directories
- The Admin Console web application files
- The ENVI 3D Web Viewer web application files
- Job sandboxes, which are directories where a worker process writes IDL/ENVI files (by default). It will also generate a JSON file for the HTTP request, write an IDL log file, and place a temporary directory here for IDL. Each job gets its own sandbox within the ese/jobs directory. Each sandbox is named according to the job number. They are cleaned up by the ESE master process after a period of time.
- The configuration files needed for ENVI® for ArcGIS® - Services Edition.

The docroot/ese/data folder contains sample data files that can be used to test ENVI analytics. The docroot/ese/data_upload directory contains data uploaded by client applications. Use the Data tab in the Admin Console to see the available data files. The data directory is the recommended "safe" directory for adding sample data files. For example, the job sandbox subdirectories in the jobs directory also have their contents served up, but ESE's cleanup process will eventually delete them as specified in the configuration file.

Job Database (jobdb file)

ESE employs a small SQLite database to store information relating to the execution of jobs:

- Job queue, start, and finish times
- Job status information

You should not change the Job Database; however, it is available for querying if you need to extract detailed job statistics. If so, the best option is to query it when the system is offline as the SQLite database does not allow for concurrent users.

Logs

ESE maintains a series of log files that you can use for troubleshooting and maintenance. For example, if your system doesn't boot up correctly or if you have errors with uploading tasks, you can check the log files through the Admin Console or on disk.

Licensing Overview

Exelis VIS licenses each ESE system individually. A system consists of one designated master process and a number of worker processes. These processes may either be installed on one machine locally or across several machines in a networked environment.

We base the license level of your system on two components that work together:

1. The chosen license Feature Group *and*
2. The number of concurrent workers purchased for the system.

Feature Groups

Exelis VIS offers three basic ESE Feature Groups:

Feature Group	Components Included
1	ESE + IDL
2	ESE + IDL + ENVI + FX* + NITF†
3	ESE + IDL + ENVI + FX* + NITF† + LiDAR

* ENVI Feature Extraction

† National Imagery Transmission Format extension

Additional components, such as DEM Extraction and DICOM Network Services, are available and will be licensed separately. Check with an Exelis VIS sales or professional services representative for more information on obtaining add-on components.

Concurrent Workers

The number of concurrent worker licenses purchased is independent of the number of actual workers available on the system. A general rule-of-thumb is to have the same or more actual workers available as the number of concurrent worker licenses purchased.

Job Processing and Node Locking

As job requests come in to the master, it assigns them to workers until the system reaches the maximum number of allowed concurrent workers actively processing jobs. When the system reaches that maximum number, the master queues jobs until a worker "license" is freed upon the completion of a task. The master then sends out the next job in the queue for processing.

If an in-process job requires additional features not licensed on your system, the job will fail. Check your server logs for details.

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