

Intel® Parallel Studio XE 2016 Update 2

Installation Guide for Linux* OS

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1 Introduction

This document explains how to install Intel® Parallel Studio XE on a Linux* OS system. You can install the product from the command line or using the graphical user interface (GUI). Depending on the license you have, the installer performs the installation of one of the following product editions:

- Intel® Parallel Studio XE Composer Edition
- Intel® Parallel Studio XE Professional Edition
- Intel® Parallel Studio XE Cluster Edition

For differences in contents of each edition, see *Release Notes*.

To install Intel® Parallel Studio XE on Linux* OS, you can use:

- **Offline Installer** package that contains all the components of the product;
- **Online Installer** – a small installation file that downloads and installs only specified components of the product. The installer downloads the components prior to the installation, so you can install the product in the offline mode and/or on another machine using the `--download-only` option.

The Intel® Parallel Studio XE installer automatically makes the appropriate selection of binaries, scripts, and text files from its installation archive based on the Intel® architecture of the host system where the installation process is initiated. You do not have to worry about selecting the correct software component names for the given Intel® architecture.

1.1 Licensing Information

Starting from the 2016 release, the named-user license provisions in the Intel® Software Development Products EULA (available as `EULA.txt` at `<install_dir>/parallel_studio_xe_2016.x.xxx/licensing`) changed to only allow the software to be installed on up to three systems, tracked by the system host ID. To install the product on another system after you have reached this limit, you will need to release an old system host ID from the registration system.

As an additional consequence to this change as well as some changes to the license design, you will need an updated license to use Intel® Parallel Studio XE 2016. Additional information is provided here. If you have further questions or concerns, please contact Technical Support.

If you have any questions on licensing, visit the Licensing FAQ page.

2 Prerequisites

Before you start the installation, you are recommended to complete the following prerequisite steps:

1. Go to Intel® Software Development Products Registration Center and register the product by providing your e-mail and serial number. You can find the serial number (for example, C111-12345678) within the e-mail receipt of your product purchase. Once the admission has been granted into the registration center, you will be able to manage your licenses and access the Intel® Premier Support web page for software support.
2. As one of the product activation methods, you can choose the activation with a license file. To obtain a license file from the Intel® Software Development Products Registration Center, you need to provide the host name and host ID information for the host computer that you install the associated license file on. For instructions on how to do this, see the related articles for named-user and node-locked and floating licenses.
3. If your login account does not have administrative access, and the installation directory requires system administrative write privileges (for example, `/opt/intel`), you may need the assistance from your system administrator in installing the associated software packages on your system.
4. On the system where the Intel® Parallel Studio XE components are to be installed, you are recommended to create a staging area in a directory such as `/tmp`. For example: `/tmp/psxe_staging_area`.

   Extract the contents of the installation package to this folder using the command:

   ```
   tar -xvzf <install_package>.tgz -C /tmp/psxe_staging_area
   ```

   The Intel® Parallel Studio XE installation package has the following naming convention:

   ```
   parallel_studio_xe_<major>[_beta][_update<update>].tgz
   ```

   where `<major>` is the product release version. For example: `parallel_studio_xe_2016_update2.tgz`
5. Before running an installation, review the available installer options to decide whether you want to use any of them. To see the full list of available options, run the installer with the `--help` option, or refer to the Installer Options section.

Once you completed all the prerequisite steps, you are ready to install Intel® Parallel Studio XE.

2.1 Notes for Cluster Installation

2.1.1 Selecting Installation Method

Before you begin the installation, you need to decide what installation method you need:

- An install of the software on a single file server that is accessible to all nodes of the cluster.
- A distributed install where the software components are installed on each node of the cluster.

For a distributed install, you need to create a `machines.LINUX` file, or use the existing `machines.LINUX` file to deploy the appropriate software components amongst the nodes of the

cluster. The `machines.LINUX` file contains a list of the computing nodes for the cluster. The format is one host name per line.

The host name should be the same as the result from the Linux command `hostname`. The following shows an example of the content for the file `machines.LINUX`, where a contrived cluster consists of eight nodes:

```
clusternode1
clusternode2
clusternode3
clusternode4
clusternode5
clusternode6
clusternode7
clusternode8
```

A line of text in the example above is considered a comment line if the first column contains the "#" symbol. The first node in the list is the master node. The remaining nodes are the compute nodes. The text `clusternode1` and `clusternode2`, for example, represent the names of two of the nodes in a contrived computing cluster.

Put the resulting `machines.LINUX` file to the previously created staging area, where the installation files reside. Otherwise, you will have to provide the path to this file during the installation.

2.1.2 Establishing Secure Shell Connectivity

Secure shell connectivity is intended to provide secure, encrypted communication channels between two or more cluster nodes over an insecure network. You can use the Expect* shell script file `sshconnectivity.exp` provided in the installation package to establish secure shell connectivity on a cluster system. The Expect script is a tool for automating interactive applications. To run `sshconnectivity.exp`, you need to have the Expect run-time software installed on your Linux* system. To make sure that it is properly installed, type: `which expect`

If you encounter the "`Command not found.`" error message, you can download the Expect software package from: http://www.nist.gov/el/msid/expect.cfm

The syntax for the `sshconnectivity.exp` command is as follows:

```
./sshconnectivity.exp machines.LINUX
```

The expect shell script creates or updates the `~/.ssh` directory on each node of the cluster beginning with the master node which is the first name listed in the `machines.LINUX` file. This script will prompt you for your password twice. Upon successful completion of the script, the following message fragment appears:

```
...
**********************************************************************
Node count = 4
Secure shell connectivity was established on all nodes.
```

```
...
**********************************************************************
...
```

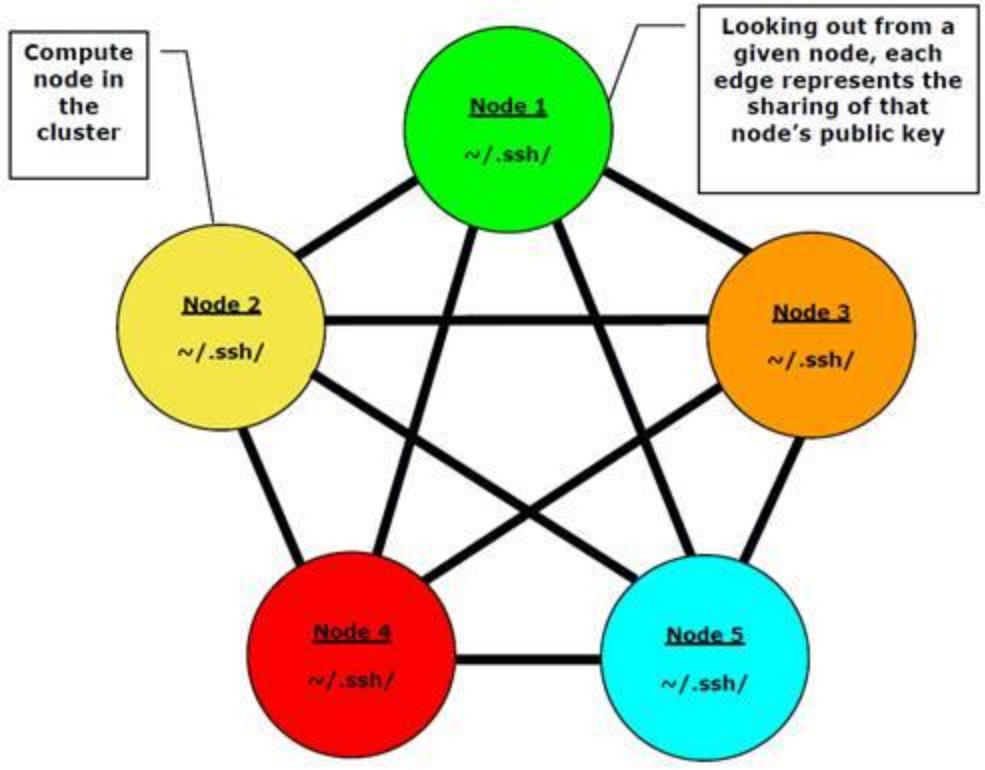
A log of the transactions for this script is recorded in `/tmp/sshconnectivity.<login-name>.log` where `<login-name>` is a placeholder for your actual login.

The shell script `sshconnectivity.exp` removes the write access capability on the group and other "permission categories" for the user's home directory. Otherwise, a password prompt will continue to be issued for any secure shell activity.

This process of establishing secure shell connectivity is demonstrated by the following graph. In this graph, a vertex represents a cluster computing node, and an edge between two vertices connotes that the two cluster computing nodes have exchanged public keys for secure shell connectivity.

The script `sshconnectivity.exp` calls the appropriate secure shell utilities to generate a private key and a public key for each node of the cluster.

Secure Shell Connectivity for a Computing Cluster



For the complete graph example in the figure above, suppose there are nodes (vertices) `1` to `n` in the cluster. For a given node `i`, nodes `1` to `i - 1` and nodes `i + 1` to `n` are provided with the public key from node `i`. The user's public keys for a given node are stored in the `~/.ssh` folder associated with the user's home directory for that computing node. Since there are `n - 1` edges to a given node `i` in the figure above, the node `i` will have `n- 1` public keys in the `~/.ssh` folder that were provided by the other `n - 1` nodes in the cluster. This example represents a computing cluster that has a total of five nodes. The edges connecting a node indicate that the node has received four public keys from the remaining computing nodes. Also looking out from a given node indicates that the given node has provided its own public key to the remaining nodes that are reachable through the four edge paths.

If the home directory for a cluster is shared by all of the cluster nodes, for example, all of the nodes use the same `~/.ssh` folder, the connectivity illustrated in the figure above is represented through the contents of the `~/.ssh/known_hosts` file.

Once secure shell connectivity is established, you are ready to install Intel® Parallel Studio XE on your cluster.

3 Installation

3.1 Using Online Installer

The Online Installer is a small installation script that downloads and installs only those components of the product that you select during the installation. This process requires an active internet connection. If you are behind a proxy, make sure to set the appropriate proxy settings (you can use the installer options to do this).

To start the installation, run the online installer script. A typical script name may look as follows:

```
parallel_studio_xe_2016_update2_online.sh
```

After running the script, follow the installation wizard instructions. Installation from the command line, through the graphical user interface and silent installation are described in detail further in the document.

3.1.1 Storing Download Content

When using the Online Installer, you can also install the product offline or on another machine. To do this, download the installation package with only selected components prior to the installation using the `--download-only` option. After that you will be able to use the customized package offline or on another machine.

Do the following:

1. Run the installation script with the `--download-only` option. Use the `--download-dir <folder>` option to set the location where the installation package is to be downloaded. The default download location is `/tmp/<username>`.

```
parallel_studio_xe_2016_update2_online.sh --download-only --download-dir /tmp/psxe_custom_pkg
```

Avoid using relative paths in the `--download-dir` option. This may cause unexpected problems during the installation

2. Follow the installation wizard instructions. You will be able to:
   - Select the product activation method
   - Select the architecture for which you want to build your applications
   - Select the components to download

   Once you have completed these steps, the installer will download the customized installation package to the download location.
3. Go to the download location and run the `install.sh` or `install_GUI.sh` script to start the installation. Installation from the command line, through the graphical user interface and silent installation are described in detail further in the document.

   You can also use this package to install the product on another machine. This step does not require internet connection.

3.2 Installation Through Command Line Interface (CLI)

To install Intel Parallel Studio XE from the command line, complete the steps below:

1. Run the `install.sh` script located at the top level of your installation archive. If you want to use the Online Installer, run the `parallel_studio_xe_2016[_update<update>]_online.sh` script. The **Welcome** dialog appears.
2. Press the "Enter" key to continue the installation. If your system is configured correctly, the installation proceeds to the activation step. Otherwise, the **Missing Optional Prerequisite(s)** or the **Missing Critical Prerequisite(s)** dialog appears.

   You can continue the installation with missing optional prerequisites. However, if you are missing any critical prerequisites, you need to fix the issue and restart the installation. When you are done, proceed to the next step.
3. Read and accept the terms of the End User License Agreement (EULA). After reading the EULA, type "`accept`" and press "Enter" to continue the installation.
4. In the following dialog, select the activation option you can use:
   1. Use the existing license (default)
   2. Use a serial number
   3. Evaluate the product (unavailable in Beta releases)
   4. Use a license file or Intel® Software License Manager

   If you use option 4, the installer prompts to choose you between:

- Offline activation (using a license file)
- Activation using a license manager

If you choose offline activation, you can proceed to provide the path to the license file location.

5. Choose whether you want to participate in the Intel® Software Improvement Program. If you opt in, Intel will automatically receive anonymous information about how you use your current and future Intel® Software Development Products. You can stop participating at any time using the Intel® Software Manager.

   This dialog is unavailable in Beta releases, opt-in is enabled by default.

6. **(Cluster Edition only)** Choose between installation on a single cluster node and a distributed installation. By default, a single-node installation is selected.

   If you choose the distributed installation, the following options are available:

   - Configuration type
   - File name for the cluster nodes list (see here for details)
   - Number of parallel installations
   - Check for shared installation directory

7. The next dialog summarizes the selected installation options, including the installation directory and the components to install. To start the installation immediately with the currently selected options, enter 1. Otherwise, enter 2 to proceed to the customization dialogs described below:

   1. Select the architectures for which you want to build your applications. By default, IA-32 and Intel® 64 architectures are selected.
   2. Review the main configuration dialog. The sub-options of this dialog enable you to:
      - Choose the installation directory (for example, `/opt/intel`)
      - Select components to install
      - Modify the advanced options

8. If you chose any open-source components to be installed with this product, the **Installation of Open Source Components** dialog displays your selection.
9. Press the "Enter" key to start the installation. When all the selected components are installed, the **Complete** dialog appears.

3.3 Installation Through Graphical User Interface (GUI)

To install the product using the GUI, complete the steps described below:

1. Run the `install_GUI.sh` script located at the top level of your installation archive. If you want to use the Online Installer, run the `parallel_studio_xe_2016[_beta][_update<update>]_online.sh` script with the `--gui-mode` option.

The **Welcome** dialog appears. The left-side panel of the installation window provides a progress report showing the current stage of the installation process:

- Welcome
- Prerequisites
- License agreement
- Activation
- Intel® Software Improvement Program (unavailable in Beta)
- Options
- Installation
- Complete

Click the **Next** button to continue.

2. Review the **Prerequisites** dialog box to see whether your system is properly configured for the Intel Parallel Studio XE installation. You can proceed with the installation if you are missing optional prerequisites. However, if you are missing any critical prerequisites, you need to fix the issue before you can continue. When you are done, click the **Next** button.
3. Read and accept the terms of the End User License Agreement (EULA) by selecting the corresponding radio button. Click the **Save** button to save the text of the license agreement to your system.
4. Choose one of the activation options by selecting the corresponding radio button:
    - Use existing license - choose this option if you have a valid license file.
    - Use serial number to activate and install product - choose this option if you have a serial number. This option requires an internet connection.
    - Evaluate this product (no serial number required) - choose this option if you do not have a serial number or if you want to activate the product later. This option is not available for Beta releases.
    - Choose alternative activation - choose this option if you want to do one of the following:
        - Activate offline (using a license file)
        - Use a license manager

    When done, click **Next** to continue.
5. **(Cluster Edition only)** Choose between installation on a single cluster node and a distributed installation on multiple nodes by selecting the corresponding radio button. If you decide to install the product on all nodes of your cluster, you need to provide the path to the `machines.LINUX` file that lists all nodes of your cluster (see here for details), and enter the number of parallel installations you want to perform.

6. Choose whether you want to participate in the Intel® Software Improvement Program. If you opt in, Intel may automatically receive anonymous information about how you use your current and future Intel® Software Development Products. You can stop participating at any time using the Intel® Software Manager.

   This dialog is unavailable in Beta releases, opt-in is enabled by default.

7. Review the **Installation Summary** to see whether the selected installation options meet your needs. To change the selection, click the **Customize installation** button and proceed to change the following options:

   - Choose an alternative installation directory.
   - Select target architecture(s) for your applications to run on. By default, IA-32 and Intel® 64 architectures are selected.
   - Select the components to install.
   - Configure advanced options of the product components.

   To proceed with the installation, click the Install button.

8. If applicable, review the list of the open-source components to be installed with this product. The **Installation of Open Source Components** dialog box displays your selection.
9. Click **Next** to start the installation. When all the selected components are installed, the **Complete** window is displayed.

3.4 Silent Install Mode

You can install Intel® Parallel Studio XE using the silent installation mode that does not require human interaction.

To install the product in silent mode, do the following:

1. Revise the `silent.cfg` configuration file according to your needs. For the Offline Installer, this file is provided in the installation package. For the Online Installer, the configuration file is downloaded to the temporary folder when you run the installer. By default, this folder is `/tmp/<username>`.

   Make sure you have changed the `ACCEPT_EULA` value to `accept` to start the installation.

2. Run the installation script with the `--silent=<path_to_silent.cfg>` option.

3.4.1 Using Settings from Interactive Installation

When installing the product in the interactive mode (through CLI or GUI), you can record all your inputs into a configuration file and then use this file for silent installation.

To generate a configuration file, use the following installer option when running an interactive installation: `--duplicate=<config_file>.cfg`

The configuration file with the specified name will be created. Use this file for silent installation.

4 Installation Folders

Following a successful installation, the files associated with Intel® Parallel Studio XE appear on your host system. The table below indicates the default installation folder structure.

The folder contents may vary depending on the edition of Intel Parallel Studio XE you have installed. In the table below, folders belonging to each edition are marked as follows:

- All editions (no background)
- Professional and Cluster Editions
- Cluster Edition

The default installation folder is: `/opt/intel`

Folder	Description
`advisor_xe`	Symbolic link to the latest version of Intel® Advisor XE
`advisor_xe_2016`	Symbolic link to the latest update of Intel® Advisor XE 2016
`advisor_xe_2016.x.xx.xxxxxx`	Subdirectory for Intel® Advisor XE
`bin`	Subdirectory containing symbolic links to Intel® Parallel Studio XE compilers and libraries binary files
`clck`	Subdirectory for Intel® Cluster Checker
`clck_latest`	Symbolic link to the latest version of Intel® Cluster Checker
`compilers_and_libraries`	Symbolic link to the latest version of the Intel® Parallel Studio XE compilers and libraries products
`compilers_and_libraries_2016`	Subdirectory containing symbolic links to Intel® Parallel Studio XE 2016 compilers and libraries products
`compilers_and_libraries_2016.x.xxx`	Subdirectory for each update of the Intel® Parallel Studio XE 2016 compilers and libraries products
`daal`	Symbolic link to the Intel® Data Analytics Acceleration Library subdirectory
`debugger_2016`	Subdirectory containing debugger of Intel® Parallel Studio XE 2016
`documentation_2016`	Subdirectory for the Intel® Parallel Studio XE 2016 documentation
`ide_support_2016`	Subdirectory containing IDE support of Intel® Parallel Studio XE 2016
`imb`	Subdirectory for Intel® MPI Benchmarks packages (old versions) and symbolic links (newer version)
`impi`	Subdirectory for Intel® MPI Library packages (old versions) and

	symbolic links (newer version)
include	Symbolic link to Intel® Parallel Studio XE compilers and libraries include subdirectory
inspector_xe	Symbolic link to the latest version of Intel® Inspector XE
inspector_xe_2016	Symbolic link to the latest update of Intel® Inspector XE 2016
inspector_xe_2016.x.xx.xxxxxx	Subdirectory for Intel® Inspector XE 2016
ipp	Symbolic link to the Intel® Integrated Performance Primitives subdirectory
ism	Subdirectory for Intel® Software Manager
itac	Subdirectory for Intel® Trace Analyzer and Collector
itac_9.1	Symbolic to link to the latest update of Intel® Trace Analyzer and Collector 9.1
itac_latest	Symbolic link to the latest version of Intel® Trace Analyzer and Collector
lib	Symbolic link to the Intel® Parallel Studio XE compilers and libraries subdirectory
licenses	Subdirectory containing license files
man	Symbolic link to the Intel® Parallel Studio XE Composer Edition manuals subdirectory
mkl	Symbolic link to the Intel® Math Kernel Library subdirectory
parallel_studio_xe_2016.x.xxx • bin • licensing • <component links>	Subdirectory for Intel® Parallel Studio XE 2016 with the uninstall scripts and symbolic links to the installed components Location of psxevars.[c]sh and sshconnectivity.exp Location of the licensing files
samples_2016	Subdirectory containing samples/tests for Intel® Parallel Studio XE 2016
tbb	Symbolic link to the Intel® Threading Building Block subdirectory
vtune_amplifier_xe	Symbolic link to the latest version of Intel® VTune Amplifier XE
vtune_amplifier_xe_2016	Symbolic link to the latest update of Intel® VTune Amplifier XE 2016
vtune_amplifier_xe_2016.x.xx.xxxxxx	Subdirectory for Intel® VTune Amplifier XE 2016

5 After Installation Steps

5.1 Getting Started

After the installation is complete, the Intel® Parallel Studio XE Getting Started page is opened. See the Getting Started page to get information about the components installed and instructions on how to get started with the product.

The document is located at:

`<install_dir>/documentation_2016/en/ps2016/getstart_*.htm`

5.2 Verifying Cluster Configuration

(Cluster Edition only)

For clusters based on the Linux* OS, you can verify the cluster configuration and performance using Intel® Cluster Checker. If issues are found, Intel® Cluster Checker diagnoses the problems and may provide recommendations on how to repair the cluster. For more details, refer to the Intel® Cluster Checker documentation available at: `<install_dir>/clck/<version>/doc`

6 Uninstalling the Product

To uninstall the Intel® Parallel Studio XE on Linux* OS, use the shell scripts `uninstall.sh` or `uninstall_GUI.sh` located at:

`<install-dir>/parallel_studio_xe_2016.x.xxx`

After invoking this script, follow the prompts for the uninstall process.

7 Installer Options

7.1 Offline Installer Options

Option	Description
`-h, --help`	Print help message
`-v, --version`	Print the version information
`-s, --silent <file>`	Run the installation silently using the settings in the configuration file
`-d, --duplicate <file>`	Run the installation interactively, record the user input into the configuration file
`-t, --tmp-dir <folder>`	Set a custom temporary folder
`-l, --lang`	Set the user interface language
`--user-mode`	Run the installation with the current user privileges
`--signature <file>`	Set the public key file for digital signature validation of the Red Hat* Package Manager (RPM) packages
`--ignore-signature`	Skip the signature validation
`--ignore-cpu`	Skip CPU model check
`--nonrpm-db-dir <folder>`	Set a directory to store the product installation database
`--SHARED_INSTALL`	Install the product to a network-mounted drive or shared file system for multiple users

7.2 Online Installer Options

Option	Description
`-h, --help`	Print help message
`-v, --version`	Print the version information
`-t, --tmp-dir <folder>`	Set a custom temporary folder
`-D, --download-dir <folder>`	Set a custom download folder
`-o, --download-only`	Download the installation package without installing the product
`-s, --silent <file>`	Run the installation silently using the settings in the configuration file

`-d, --duplicate <file>`	Run the installation interactively, record the user input into the configuration file
`--cli-mode`	Run the installation in command-line mode
`--gui-mode`	Run the installation in graphical mode
`--user-mode`	Run the installation with the current user privileges
`--signature <file>`	Set the public key file for digital signature validation of the Red Hat* Package Manager (RPM) packages
`--ignore-signature`	Skip the signature validation
`--nonrpm-db-dir <folder>`	Set a directory to store the product installation database
`--SHARED_INSTALL`	Install the product to a network-mounted drive or shared file system for multiple users
`--http-proxy http://HOST:PORT`	Specify the HTTP proxy
`--https-proxy https://HOST:PORT`	Specify the HTTPS proxy

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