SEP/EMON Installation Guide

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Contents

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Revision History

Revision Number	Description	Revision Date
0.1	Initial release	February 2018
0.2	Reworded and reorganized the entire help document	February 2018
0.3	Added FreeBSD (un)installation details	May 2018
0.4	Added Mac OS (un)installation details	May 2018

About SEP/EMON Installer

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SEP/EMON installer is a script-based installer that provides the ability to install SEP and EMON. It provides an interactive and non-interactive mode. It lets users choose multiple configurations during installation.

Intended Audience

This document is intended for Intel developers who use SEP or EMON to monitor software performance on IA-32 or Intel® 64 systems. Use this document to install or uninstall SEP or EMON.

Related Information

- For SEP options, see the SEP User's Guide.
- For EMON options, see the EMON User's Guide.

- For SEP options that are available to internal SEP users, see the internal version of the SEP User's Guide.
- For EMON options that are available to internal EMON users, see the internal version of the EMON User's Guide.

- For information about Intel® VTune™ Profiler, see https://software.intel.com/en-us/vtune/documentation.
- For information on Performance Monitoring Unit (PMU) counters, see http://www.intel.com/content/www/us/en/processors/architectures-software-developer-manuals.html.

Automated Installation and Uninstallation

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You can run SEP/EMON on these operating systems. Follow appropriate installation instructions.

- Windows* OS
- Linux* OS
- Android* OS
- FreeBSD* OS
- macOS*

Installation Options:

You can install SEP/EMON through one of these ways:

- Directly with Intel® VTune™ Profiler
- Independently from the internal release package

Use this document to install from the internal release package.

The release package provides an automated installer for all operating systems except Android* OS. You must have `sudo/root/administrative` privileges to install the tools.

If installation fails using the automated installer, install SEP/EMON manually.

Windows*

Follow these instructions to install or uninstall SEP/EMON automatically on a Windows* machine.

Installation

To install SEP/EMON automatically on a Windows* machine:

1. Unzip the install package (`sep_private_<x>_<y>_win_<build_number>.zip`) to a temporary directory.

   The following files should appear in the temporary directory:

   ```
   sep_private_<x>_<y>_win_<build_number>.zip
       \sep-installer.cmd
       \license.txt
       \README.txt
       \Installer_Overview.pdf
       \sep_private_<x>.<y>_win_<build_number>.zip
   ```

2. Run `sep-installer.cmd` to install the tool.

   The package will be installed at `C:\Program Files (x86)\IntelSWTools\sep` by default.

   - **Interactive Mode:** `sep-installer.cmd` is an interactive script that requires user input to complete installation.
   - **Non-interactive Mode:** Use `sep-installer.cmd /?` to get the help menu for the non-interactive mode. The commands for various use cases are mentioned below:

     - Install SEP/EMON with default options non-interactively: `sep-installer.cmd -i --accept-license -ni`
     - Uninstall all previous installations: `sep-installer.cmd -U -ni`
     - Uninstall all previous installations and install SEP/EMON: `sep-installer.cmd -U -i --accept-license -ni`

   Upon successful installation, you see this message:

```
-------------------------------------------------------------
                    SEP INSTALLATION
-------------------------------------------------------------

SEP is installed at C:\Program Files (x86)\IntelSWTools\sep.

Set the environment variables using the following command:
   C:\Program Files (x86)\IntelSWTools\sep\sep_vars.cmd

[q] Quit

-------------------------------------------------------------
```

These files should appear in the installed location:

```
android_target
bin64
config
docs
include
lib64
sep_vars.cmd
sep_vars.ps1
```

3.   Run `sep_vars.cmd` to set up the environment variables for the current shell, and then begin using SEP/EMON.

NOTE Use `sep -help | emon -h` to explore SEP/EMON capabilities.

Uninstallation

To uninstall SEP/EMON automatically from a Windows* machine:

1.   Run `sep-installer.cmd`.
2.   Select the uninstall option from the menu.

```
-------------------------------------------------------------
                    SEP INSTALLATION
-------------------------------------------------------------

The following SEP installation(s) have been found in the system:

- sep_5.14_win_120520010138d4b

- sep_5.15_win_0113200117a02e9


[q] Quit

-------------------------------------------------------------
Uninstall all previous installations [N/y]:
```

Linux*

Use the following instructions to install or uninstall SEP/EMON automatically on a Linux* machine.

Installation

Prerequisites

Before you build SEP drivers in your Linux system, ensure the following:

- GCC and Make are available.
- Kernel headers are available.
- Kernel headers match the kernel version available in the system.

If GCC, Make or kernel headers are unavailable, use this table to install them. Use the default package manager for the relevant distribution.

> **NOTE** If the kernel is compiled from sources, you must install kernel headers from the sources as well.

Distribution	Installation Instructions with Default Package Manager
Debian/Ubuntu	Check if kernel headers are available: ``` uname -r ls -l /usr/src/linux-headers-$(uname -r) ``` Install if unavailable: ``` apt install build-essential apt install linux-headers-$(uname -r) ```
RHEL/CentOS/Fedora	Check if kernel headers are available: ``` uname -r ls -l /usr/src/kernels/$(uname -r) ``` Install if unavailable on RHEL/CentOS: ``` yum install "Development Tools" yum install kernel-devel-$(uname -r) ``` Install if unavailable on Fedora: ``` dnf install gcc dnf install make dnf install kernel-devel ```
OpenSUSE/SLES	Check if kernel headers are available: ``` uname -r ls -l /usr/src/linux ```

Distribution	Installation Instructions with Default Package Manager
	Install if unavailable: ``` zypper install gcc zypper install make zypper search -s kernel-devel (search for kernel version 'uname -r') zypper install kernel-devel ```
Clear Linux	Install if unavailable: ``` swupd bundle-add c-basic swupd search linux-dev (search for kernel version 'uname -r') swupd bundle-add linux-dev ```

To Install SEP/EMON on a Linux* Machine

1. Untar the install package (`sep_private_<x>_<y>_linux_<build_number>.tar.bz2`) to a temporary directory.

    These files should appear in the specified directory:

```
sep_private_<x>_<y>_linux_<build_number>.tar.bz2
    \sep-installer.sh
    \license.txt
    \README.txt
    \Installer_Overview.pdf
    \sep_private_<x>.<y>_linux_<build_number>.tar.bz2
```

2. Open a new shell and run `./sep-installer.sh` to install the tool.

    The installer prompts for a password when attempted without root privileges.

```
User Type Selection
---------------------------------------------------------------
                    SEP INSTALLATION
---------------------------------------------------------------

        [1] Run as sudo user [default]
        [2] Run as root

        [q] Quit
---------------------------------------------------------------
Please enter a selection or press "Enter" to accept default choice [1]:
```

The package is installed at `/opt/intel/sep` by default.

-   **Interactive Mode:** `sep-installer.sh` is an interactive script that requires user input to complete installation by default.
-   **Non-interactive Mode:** Use `sep-installer.sh -h` to get the help menu for non-interactive mode. The commands for various use cases are mentioned below:
    -   Install SEP/EMON with default options non-interactively: `./sep-installer.sh -i --accept-license -ni`

- Complete a failed installation due to driver load/build failure: `./sep-installer.sh --load-driver-only -ni`
- Uninstall all previous installations: `./sep-installer.sh –u –ni`
- Uninstall all previous installations and install SEP/EMON with driver access group user_group: `./sep-installer.sh -u -i --accept-license -g user_group -ni`

3. Select **[n]** in all screens to install with default options.

The startup screen is presented below:

```
Install Location
----------------------------------------------------------------
                        SEP INSTALLATION
----------------------------------------------------------------


        Install location: /opt/intel

Installer searches for existing SEP installations in this path.
Default install location: /opt/intel

        [q] Quit
----------------------------------------------------------------
Please enter a value/option or press "Enter" to accept default value [n]:
```

The installer checks for existing installation(s) based on the provided location. See Uninstallation for details about uninstall options.

This is the "Options" screen. See Advanced Install Options to learn more details about each option.

```
Step 2 of 5 | Options
----------------------------------------------------------------
                        SEP INSTALLATION
----------------------------------------------------------------


        Select an option to know more details

        Driver build options
        [1] C compiler                  [/usr/bin/gcc]
        [2] Make command                [/usr/bin/make]
        [3] Kernel source dir           [/lib/modules/4.15.0-45-generic/build]

        Driver access options
        [4] Driver access group         [vtune]
        [5] Driver permission           [660]

        Driver install options
        [6] Load drivers                [yes]
        [7] Reload automatically at reboot [no]
        [8] Complete failed installation   [no]

        General options
        [9] Change install location     [/opt/intel]

        [b] Back        [n] Next        [q] Quit
----------------------------------------------------------------
Please enter an option or press "Enter" to accept default value [n]:
```

Upon successful installation, the following message is displayed:

```
Step 5 of 5 | Finish
-------------------------------------------------------------
                        SEP INSTALLATION
-------------------------------------------------------------


SEP has been successfully installed at /opt/intel/sep.
Use "source /opt/intel/sep/sep_vars.sh" to set up the environment.


-------------------------------------------------------------
Press "Enter" to exit installation:
```

These files should appear in the installed location:

```
android_target
bin64
config
docs
include
lib64
sepdk
sep_vars.sh
```

4. Create a Bash* shell, and then run `source /opt/intel/sep/sep_vars.sh` to set up the SEP runtime environment.

> **NOTE** Use `sep -help | emon -h` to explore SEP/EMON capabilities.

Uninstallation

Use the installer to uninstall individual or all previous installations automatically from a Linux* machine. Here are the available uninstallation options for Linux*.

```
Step 1 of 5 | Uninstall
-------------------------------------------------------------
                        SEP INSTALLATION
-------------------------------------------------------------


-------------------------------------------------
sep_private_5.21_beta_linux_090802014a1f428 is already installed!
-------------------------------------------------


        [1] Uninstall sep_private_5.20_linux_08142003f594613
        [2] Uninstall sep_private_5.21_beta_linux_090802014a1f428
        [3] Uninstall all previous installation(s)
        [4] Uninstall ONLY driver


        [n] Next          [q] Quit
-------------------------------------------------------------
Please enter an option or press "Enter" to accept default value [n]:
```

- To uninstall all previous installations, select option **[3]**.
- To uninstall only drivers and to perform no clean-up, select option **[4]**.

The image below lists all available driver uninstallation options when option **[4]** is chosen.

```
Uninstall Driver
-------------------------------------------------------------
                      SEP INSTALLATION
-------------------------------------------------------------


     Uninstall corresponding driver from the below list:
     [1] sep_private_5.20_linux_08142003f594613
     [2] sep_private_5.21_beta_linux_090802014a1f428


     [b] Back         [q] Quit
-------------------------------------------------------------
Please enter an option or press "Enter" to accept default value [b]:
```

FreeBSD*

Use the following instructions to install or uninstall SEP/EMON automatically on a FreeBSD* machine.

Installation

To install SEP/EMON automatically on a FreeBSD* machine:

1.   Untar the install package (`sep_private_<x>_<y>_freebsd_x86_64_<build_number>.tar.bz2`) to a temporary directory.

     These files should appear in the specified directory:

```
sep_private_<x>_<y>_freebsd_x86_64_<build_number>.tar.bz2
    \sep-installer.sh
    \license.txt
    \README.txt
    \Installer_Overview.pdf
    \sep_private_<x>.<y>_freebsd_x86_64_<build_number>.tar.bz2
```

2.   Open a new shell and run `./sep-installer.sh` to install the tool.

     The installer prompts for a password when attempted without root privileges.

```
User Type Selection
-------------------------------------------------------------------
                        SEP INSTALLATION
-------------------------------------------------------------------


        [1] Run as sudo user [default]
        [2] Run as root


        [q] Quit
-------------------------------------------------------------------
Please enter a selection or press "Enter" to accept default choice [1]:
```

The package will be installed at `/opt/intel/sep` by default.

- **Interactive Mode:** `sep-installer.sh` is an interactive script that requires user's input to complete installation.
- **Non-interactive Mode:** Use `sep-installer.sh -h` to get the help menu for non-interactive mode. The commands for various use cases are mentioned below:

  - Install SEP/EMON with default options non-interactively: `./sep-installer.sh -i --accept-license -ni`
  - Complete a failed installation due to driver load/build failure: `./sep-installer.sh --load-driver-only -ni`
  - Uninstall all previous installations: `./sep-installer.sh -u -ni`

- Uninstall all previous installations and install SEP/EMON with driver access group user_group: ./sep-installer.sh -u -i --accept-license -g user_group -ni
3. Select **[n]** in all screens to install with default options.

The startup screen is presented below:

```
Install Location
----------------------------------------------------------------
                        SEP INSTALLATION
----------------------------------------------------------------


        Install location: /opt/intel

Installer searches for existing SEP installations in this path.
Default install location: /opt/intel


        [q] Quit
----------------------------------------------------------------
Please enter a value/option or press "Enter" to accept default value [n]:
```

The installer checks for existing installation(s) based on the provided location. See Uninstallation for details about uninstall options.

This is the "Options" screen. See Advanced Install Options to learn more details about each option.

```
Step 2 of 5 | Options
----------------------------------------------------------------
                        SEP INSTALLATION
----------------------------------------------------------------


        Select an option to know more details

        Driver access options
        [1] Driver access group            [vtune]
        [2] Driver permission              [660]

        Driver install options
        [3] Load drivers                   [yes]

        General options
        [4] Change install location        [/opt/intel]

        [b] Back          [n] Next         [q] Quit
----------------------------------------------------------------
Please enter an option or press "Enter" to accept default value [n]:
```

Upon successful installation, this message is displayed:

```
Step 5 of 5 | Finish
----------------------------------------------------------------
                        SEP INSTALLATION
----------------------------------------------------------------


SEP has been successfully installed at /opt/intel/sep.
Use "source /opt/intel/sep/sep_vars.sh" to set up the environment.


----------------------------------------------------------------
Press "Enter" to exit installation:
```

These files should appear in the installed location:

```
bin64
config
docs
include
lib64
sepdk
sep_vars.sh
```

4. Create a Bash* shell: `sh`, and then set up the SEP/EMON runtime environment by sourcing the `sep_vars.sh` file in the current Bash* shell: `source /opt/intel/sep/sep_vars.sh`.

> **NOTE** Use `sep -help | emon -h` to explore SEP/EMON capabilities.

Uninstallation

Use the installer to uninstall individual or all previous installations automatically from a FreeBSD* machine. Here are the available uninstallation options.

```
Step 1 of 5 | Uninstall
--------------------------------------------------------------
                    SEP INSTALLATION
--------------------------------------------------------------


---------------------------------------------------
sep_private_5.21_beta_freebsd_x86_64_090802014a1f428 is already installed!
---------------------------------------------------


        [1] Uninstall sep_private_5.20_freebsd_x86_64_08142003f594613
        [2] Uninstall sep_private_5.21_beta_freebsd_x86_64_090802014a1f428
        [3] Uninstall all previous installation(s)
        [4] Uninstall ONLY driver

        [n] Next        [q] Quit
--------------------------------------------------------------
Please enter an option or press "Enter" to accept default value [n]:
```

- To uninstall all previous installations, select option **[3]**.
- To uninstall only drivers and to perform no clean-up, select option **[4]**.

The installer lists all available driver installations when option **[4]** is chosen:

```
Uninstall Driver
--------------------------------------------------------------
                    SEP INSTALLATION
--------------------------------------------------------------


        Uninstall corresponding driver from the below list:
        [1] sep_private_5.20_freebsd_x86_64_08142003f594613
        [2] sep_private_5.21_beta_freebsd_x86_64_090802014a1f428

        [b] Back        [q] Quit
--------------------------------------------------------------
Please enter an option or press "Enter" to accept default value [b]:
```

macOS*

Use the following instructions to install or uninstall SEP/EMON automatically on a macOS* machine.

Installation

To install SEP/EMON automatically on an macOS* machine:

1. Untar the install package (`sep_private_<x>_<y>_darwin_x86_64_<build_number>.tar.bz2`) to a temporary directory.

    The following files should appear in the specified directory:

```
sep_private_<x>_<y>_darwin_x86_64_<build_number>.tar.bz2
    \sep-installer.sh
    \license.txt
    \README.txt
    \Installer_Overview.pdf
    \sep_private_<x>.<y>_darwin_x86_64_<build_number>.tar.bz2
```

2. Open a new shell and run `./sep-installer.sh` to install the tool.

    The installer prompts for a password when attempted without root privileges.

```
User Type Selection
----------------------------------------------------------------
                        SEP INSTALLATION
----------------------------------------------------------------


        [1] Run as sudo user [default]
        [2] Run as root

        [q] Quit
----------------------------------------------------------------
Please enter a selection or press "Enter" to accept default choice [1]:
```

    The package will be installed at `/opt/intel/sep` by default.

    - **Interactive Mode:** `sep-installer.sh` is an interactive script that requires user's input to complete installation.
    - **Non-interactive Mode:** Use `sep-installer.sh -h` to get the help menu for non-interactive mode. The commands for various use cases are mentioned below:

        - Install SEP/EMON with default options non-interactively: `./sep-installer.sh -i --accept-license -ni`
        - Complete a failed installation due to driver load/build failure: `./sep-installer.sh --load-driver-only -ni`
        - Uninstall all previous installations: `./sep-installer.sh -u -ni`
        - Uninstall all previous installations and install SEP/EMON: `./sep-installer.sh -u -i --accept-license -ni`

3. Select **[n]** in all screens to install with default options.

    The startup screen is presented below:

```
Install Location
--------------------------------------------------------------
                      SEP INSTALLATION
--------------------------------------------------------------


       Install location: /opt/intel

Installer searches for existing SEP installations in this path.
Default install location: /opt/intel


       [q] Quit
--------------------------------------------------------------
Please enter a value/option or press "Enter" to accept default value [n]:
```

The installer checks for existing installation(s) based on the provided location. See Uninstallation for details about uninstall options.

This is the "Options" screen. See Advanced Install Options to learn more details about each option.

```
Step 2 of 5 | Options
--------------------------------------------------------------
                      SEP INSTALLATION
--------------------------------------------------------------


       Select an option to know more details

       Driver install options
       [1] Load drivers                      [yes]

       General options
       [2] Change install location          [/opt/intel]

       [b] Back          [n] Next          [q] Quit
--------------------------------------------------------------
Please enter an option or press "Enter" to accept default value [n]:
```

Upon successful installation, this message is displayed:

```
Step 5 of 5 | Finish
----------------------------------------------------------------
                      SEP INSTALLATION
----------------------------------------------------------------


SEP has been successfully installed at /opt/intel/sep.
Use "source /opt/intel/sep/sep_vars.sh" to set up the environment.


----------------------------------------------------------------
Press "Enter" to exit installation:
```

These files should appear in the installed location:

```
bin64
config
docs
include
lib64
sep_vars.sh
```

4.   Set up the runtime environment by sourcing the `sep_vars.sh` file in the current bash shell:
      `source /opt/intel/sep/sep_vars.sh`.

NOTE Use `sep -help | emon -h` to explore SEP/EMON capabilities.

Uninstallation

Use the installer to uninstall individual or all previous installations automatically from an macOS* machine. Here are the available uninstallation options for macOS*.

```
Step 1 of 5 | Uninstall
-------------------------------------------------------------
                         SEP INSTALLATION
-------------------------------------------------------------


-----------------------------------------------
sep_private_5.21_beta_darwin_x86_64_090802014a1f428 is already installed!
-----------------------------------------------


        [1] Uninstall sep_private_5.20_darwin_x86_64_08142003f594613
        [2] Uninstall sep_private_5.21_beta_darwin_x86_64_090802014a1f428
        [3] Uninstall all previous installation(s)
        [4] Uninstall ONLY driver

        [n] Next        [q] Quit
-------------------------------------------------------------
Please enter an option or press "Enter" to accept default value [n]:
```

- To uninstall all previous installations, select option **[3]**.
- To uninstall only drivers and to perform no clean-up, select option **[4]**.

The image below lists all available driver uninstallation options when option **[4]** is chosen.

```
Uninstall Driver
-----------------------------------------------------------------
                         SEP INSTALLATION
-----------------------------------------------------------------


        Uninstall corresponding driver from the below list:
        [1] sep_private_5.20_darwin_x86_64_08142003f594613
        [2] sep_private_5.21_beta_darwin_x86_64_090802014a1f428


        [b] Back        [q] Quit
-----------------------------------------------------------------
Please enter an option or press "Enter" to accept default value [b]:
```

Advanced Installation Options

3

Use the following installation options described in this chapter to customize SEP/EMON installation on Linux*, FreeBSD*, and macOS* machines. Advanced installation options are not available for Windows* machines.

Linux*

Use the following installation options to customize SEP/EMON installation on Linux* machines.

After selecting option **[n]** in uninstallation screen, the Options screen will open, as shown below.

```
Step 2 of 5 | Options
---------------------------------------------------------------
                        SEP INSTALLATION
---------------------------------------------------------------


        Select an option to know more details

        Driver build options
        [1] C compiler                    [/usr/bin/gcc]
        [2] Make command                  [/usr/bin/make]
        [3] Kernel source dir             [/lib/modules/4.15.0-45-generic/build]

        Driver access options
        [4] Driver access group           [vtune]
        [5] Driver permission             [660]

        Driver install options
        [6] Load drivers                  [yes]
        [7] Reload automatically at reboot [no]
        [8] Complete failed installation   [no]


        General options
        [9] Change install location       [/opt/intel]


        [b] Back         [n] Next          [q] Quit
---------------------------------------------------------------
Please enter an option or press "Enter" to accept default value [n]:
```

Option 1: C Compiler

Select **[1] C compiler** in `Step 2` to update the default compiler used to build the drivers, as shown below. The default is `/usr/bin/gcc`.

```
Options > C Compiler
-----------------------------------------------------------------
                        SEP INSTALLATION
-----------------------------------------------------------------


        Compiler: /usr/bin/gcc

Specify the full path and name of the C compiler to use for building
the driver. The default compiler is /usr/bin/gcc.

        [b] Back          [q] Quit
-----------------------------------------------------------------
Please enter a value/option or press "Enter" to accept default value [b]:
```

Option 2: Make Command

Select **[2] Make command** in `Step 2` to update the default make command used to build the drivers, as shown below. The default is `/usr/bin/make`.

```
Options > Make Command
-----------------------------------------------------------------
                        SEP INSTALLATION
-----------------------------------------------------------------


        Make command: /usr/bin/make

Specify the full path and name of the make command to use for building
the driver. The default make command is /usr/bin/make.

        [b] Back          [q] Quit
-----------------------------------------------------------------
Please enter a value/option or press "Enter" to accept default value [b]:
```

Option 3: Kernel Source Directory

Select **[3] Kernel source dir** in `Step 2` to update the default kernel source directory used to build the drivers, as shown below.

```
Options > Kernel Source Directory
-----------------------------------------------------------------
                        SEP INSTALLATION
-----------------------------------------------------------------


        Kernel src dir: /lib/modules/4.15.0-45-generic/build

Specify the full path to the directory where system kernel header files
are located. The default kernel src dir is /lib/modules/4.15.0-45-generic/build.

        [b] Back          [q] Quit
-----------------------------------------------------------------
Please enter a value/option or press "Enter" to accept default value [b]:
```

Option 4: Driver Access Group

Select **[4] Driver access group** in `Step 2` to update the default driver access group, as shown below. The default is `vtune`.

```
Options > Driver access group
--------------------------------------------------------------
                        SEP INSTALLATION
--------------------------------------------------------------


        Driver group: vtune

Sampling drivers are accessible only to members of a specific group.
SEP users must be added to this group. The default group is "vtune".
Specify group "root" for root usage.


        [b] Back          [n] Next          [q] Quit
--------------------------------------------------------------
Please enter a value/option or press "Enter" to accept default value [n]:
```

Option 5: Driver Permission

Select **[5] Driver permission** in `Step 2` to update the default driver permission, as shown below. The default is `660`.

```
Options > Driver access permission
--------------------------------------------------------------
                        SEP INSTALLATION
--------------------------------------------------------------


        Driver permission: 660

To restrict access to the driver, you can set custom permissions on driver
files.
Both representations such an octal number (like 660) and symbolic form (like
ug=rw) are accepted. The default permission is 660.


        [b] Back          [q] Quit
--------------------------------------------------------------
Please enter a value/option or press "Enter" to accept default value [b]:
```

Option 6: Load Drivers

Select **[6] Load drivers** in `Step 2` to update the load drivers option, as shown below. The default is `yes`.

```
Options > Load drivers
-----------------------------------------------------------------
                        SEP INSTALLATION
-----------------------------------------------------------------

The drivers are required to be loaded for data collection.
Select yes/no to load/not load the drivers.


        [1] Yes
        [2] No

        [b] Back          [q] Quit
-----------------------------------------------------------------
Please enter an option or press "Enter" to accept default value [1]:
```

Option 7: Reload Automatically at Reboot

Select **[7] Reload automatically at reboot** in `Step 2` to set up the boot script to reload drivers automatically at reboot, as shown below. The default is `no`.

```
Options > Reload drivers during boot
-----------------------------------------------------------------
                        SEP INSTALLATION
-----------------------------------------------------------------

Select yes to load the drivers during boot time.


        [1] Yes
        [2] No

        [b] Back          [q] Quit
-----------------------------------------------------------------
Please enter an option or press "Enter" to accept default value [2]:
```

Option 8: Complete Failed Installation

Select **[7] Complete failed installation** in `Step 2` to complete the installation after resolving the issue (failed driver build or loading), as shown below. The default is `no`.

```
Options > Complete failed installation
-----------------------------------------------------------------
                        SEP INSTALLATION
-----------------------------------------------------------------

Found sep_private_5.21_beta_linux_090802014a1f428 installed at /opt/intel.
Select yes to complete the installation.


        [1] Yes
        [2] No

        [b] Back          [q] Quit
-----------------------------------------------------------------
Please enter an option or press "Enter" to accept default value [2]:
```

This option is only available if the current package version is already installed in the machine. The below screen is provided if an installation is unavailable.

```
Options > Complete failed installation
-----------------------------------------------------------
                       SEP INSTALLATION
-----------------------------------------------------------

sep_private_5.21_beta_linux_090802014a1f428 not found at /opt/intel.
This option is not applicable.

        [b] Back          [q] Quit
-----------------------------------------------------------
Please enter an option or press "Enter" to accept default value [b]:
```

Option 9: Change Install Location

Select **[9] Change install location** in `Step 2` to update the install location, as shown below. The default is `/opt/intel.`

```
Install Location
-----------------------------------------------------------
                       SEP INSTALLATION
-----------------------------------------------------------

        Install location: /opt/intel

Default install location: /opt/intel

        [b] Back          [q] Quit
-----------------------------------------------------------
Please enter a value/option or press "Enter" to accept default value [b]:
```

FreeBSD*

Use the following advanced installation options to customize SEP/EMON installation on FreeBSD* machines.

After selecting option **[n]** in uninstallation screen, the Options screen will open, as shown below.

```
Step 2 of 5 | Options
-----------------------------------------------------------
                       SEP INSTALLATION
-----------------------------------------------------------

        Select an option to know more details

        Driver access options
        [1] Driver access group            [vtune]
        [2] Driver permission              [660]

        Driver install options
        [3] Load drivers                   [yes]

        General options
        [4] Change install location        [/opt/intel]

        [b] Back          [n] Next         [q] Quit
-----------------------------------------------------------
Please enter an option or press "Enter" to accept default value [n]:
```

Option 1: Driver Access Group

Select **[1] Driver access group** in `Step 2` to update the default driver access group, as shown below. The default is `vtune`.

```
Options > Driver access group
---------------------------------------------------------------
                       SEP INSTALLATION
---------------------------------------------------------------


       Driver group: vtune

Sampling drivers are accessible only to members of a specific group.
SEP users must be added to this group. The default group is "vtune".
Specify group "root" for root usage.


       [b] Back          [n] Next          [q] Quit
---------------------------------------------------------------
Please enter a value/option or press "Enter" to accept default value [n]:
```

Option 2: Driver Permission

Select **[2] Driver permission** in `Step 2` to update the default driver permission, as shown below. The default is `660`.

```
Options > Driver access permission
---------------------------------------------------------------
                       SEP INSTALLATION
---------------------------------------------------------------


       Driver permission: 660

To restrict access to the driver, you can set custom permissions on driver
files.
Both representations such an octal number (like 660) and symbolic form (like
ug=rw) are accepted. The default permission is 660.


       [b] Back         [q] Quit
---------------------------------------------------------------
Please enter a value/option or press "Enter" to accept default value [b]:
```

Option 3: Load Drivers

Select **[3] Load drivers** in `Step 2` to update the load drivers option, as shown below. The default is `yes`.

```
Options > Load drivers
------------------------------------------------------------
                    SEP INSTALLATION
------------------------------------------------------------

The drivers are required to be loaded for data collection.
Select yes/no to load/not load the drivers.


        [1] Yes
        [2] No

        [b] Back         [q] Quit
------------------------------------------------------------
Please enter an option or press "Enter" to accept default value [1]:
```

Option 4: Change Install Location

Select **[4] Change install location** in `Step 2` to update the install location, as shown below. The default is `/opt/intel`.

```
Install Location
------------------------------------------------------------
                    SEP INSTALLATION
------------------------------------------------------------


        Install location: /opt/intel

Default install location: /opt/intel

        [b] Back         [q] Quit
------------------------------------------------------------
Please enter a value/option or press "Enter" to accept default value [b]:
```

MacOS*

Use the following advanced installation options to customize SEP/EMON installation on macOS* machines.

After selecting option **[n]** in uninstallation screen, the Options screen will open, as shown below.

```
Step 2 of 5 | Options
------------------------------------------------------------
                    SEP INSTALLATION
------------------------------------------------------------


        Select an option to know more details

        Driver install options
        [1] Load drivers                     [yes]

        General options
        [2] Change install location          [/opt/intel]

        [b] Back         [n] Next        [q] Quit
------------------------------------------------------------
Please enter an option or press "Enter" to accept default value [n]:
```

Option 1: Load Drivers

Select **[1] Load drivers** in `Step 2` to update the load drivers options, as shown below. The default is `yes`.

```
Options > Load drivers
---------------------------------------------------------------
                        SEP INSTALLATION
---------------------------------------------------------------

The drivers are required to be loaded for data collection.
Select yes/no to load/not load the drivers.

        [1] Yes
        [2] No

        [b] Back          [q] Quit
---------------------------------------------------------------
Please enter an option or press "Enter" to accept default value [1]:
```

Option 2: Update Install Location

Select **[2] Update Install Location** in `Step 2` to update the install location. The default is `/opt/intel`.

```
Install Location
---------------------------------------------------------------
                        SEP INSTALLATION
---------------------------------------------------------------

        Install location: /opt/intel

Default install location: /opt/intel

        [b] Back          [q] Quit
---------------------------------------------------------------
Please enter a value/option or press "Enter" to accept default value [b]:
```

Manual Installation and Uninstallation

4

If installation fails using the automated installer, use the following steps to install SEP/EMON manually.

Windows*

Use the following instructions to install or uninstall SEP/EMON manually on a Windows* machine.

Installation

To install SEP/EMON manually on a Windows* machine:

1. Unzip the EMON install package (`sep_private_<x>_<y>_win_<build_number>.zip`) to a temporary directory.

   These files should appear in the specified location:

```
sep_private_<x>_<y>_win_<build_number>.zip
    \sep-installer.cmd
    \license.txt
    \README.txt
    \Installer_Overview.pdf
    \sep_private_<x>.<y>_win_<build_number>.zip
```

2. Unzip `sep_private_<x>.<y>_win_<build_number>.zip` to a desired location.

   For example: `C:\Program Files (x86)\IntelSWTools\sep*`.

   These files should appear in the specified location:

```
android_target
bin64
config
docs
include
sep_vars.cmd
```

3. Open a command prompt with administrative privileges.
4. Navigate to `bin64`, and then install the driver using the following command: `sepreg.exe -i`.

Uninstallation

To uninstall SEP/EMON manually from a Windows* machine:

1. Open a command prompt with administrative privileges.
2. Navigate to `bin64`, and then uninstall the driver using the following command: `sepreg.exe -u`.
3. Remove the directory from install location using the following command: `rmdir /S /Q C:\Program Files (x86)\IntelSWTools\sep*`.

Linux*

Use the following instructions to install or uninstall SEP/EMON manually on a Linux* machine.

Installation

Prerequisites

Before you build SEP drivers in your Linux system, ensure the following:

- GCC and Make are available.
- Kernel headers are available.
- Kernel headers match the kernel version available in the system.

If GCC, Make or kernel headers are unavailable, use this table to install them. Use the default package manager for the relevant distribution.

NOTE If the kernel is compiled from sources, you must install kernel headers from the sources as well.

Distribution	Installation Instructions with Default Package Manager

Debian/Ubuntu	Check if kernel headers are available:
	
	``uname -r
	ls -l /usr/src/linux-headers-$(uname -r)```
	
	Install if unavailable:
	
	``apt install build-essential
	apt install linux-headers-$(uname -r)```

RHEL/CentOS/Fedora	Check if kernel headers are available:
	
	``uname -r
	ls -l /usr/src/kernels/$(uname -r)```
	
	Install if unavailable on RHEL/CentOS:
	
	``yum install "Development Tools"
	yum install kernel-devel-$(uname -r)```
	
	Install if unavailable on Fedora:
	
	``dnf install gcc
	dnf install make
	dnf install kernel-devel```

OpenSUSE/SLES	Check if kernel headers are available: ```uname -r ls -l /usr/src/linux```

Distribution	Installation Instructions with Default Package Manager
	Install if unavailable: ``` zypper install gcc zypper install make zypper search -s kernel-devel (search for kernel version 'uname -r') zypper install kernel-devel ```
Clear Linux	Install if unavailable: ``` swupd bundle-add c-basic swupd search linux-dev (search for kernel version 'uname -r') swupd bundle-add linux-dev ```

Install SEP/EMON Manually on a Linux* Machine

1. Untar the install package (`sep_private_<x>_<y>_linux_<build_number>.tar.bz2`) to a temporary location.

These files should appear in the specified location:

```
sep_private_<x>_<y>_linux_<build_number>.tar.bz2
    \sep-installer.sh
    \license.txt
    \README.txt
    \Installer_Overview.pdf
    \sep_private_<x>.<y>_linux_<build_number>.tar.bz2
```

2. Untar `sep_private_<x>.<y>_linux_<build_number>.tar.bz2` to a desired location.

For example: `/opt/intel/sep`.

The following directories should appear in the specified location:

```
android_target
bin64
config
docs
include
lib64
sepdk
sep_vars.sh
```

3. Navigate to the following directory: `cd /opt/intel/sep/sepdk`.
4. Build the driver using the following command: `./build-driver -ni`.

NOTE The user needs to have sudo or root access to install the drivers.

---

5. Install the drivers using the following command: `sudo ./insmod-sep -g <user_group>`. The driver will be accessible only to users under the group `<user_group>`. The default is `vtune`.

Uninstallation

To uninstall SEP/EMON manually from a Linux* machine:

1. Navigate to the following directory: `cd /opt/intel/sep/sepdk`.
2. Uninstall the drivers using the following command: `sudo ./rmmod-sep -s`.
3. Remove the install directory. For example: `rm -rf /opt/intel/sep*`.

FreeBSD*

Use the following instructions to install or uninstall SEP/EMON manually on a FreeBSD* machine.

Installation

To install SEP/EMON manually on a FreeBSD* machine:

1. Untar the install package (`sep_private_<x>_<y>_freebsd_x86_64_<build_number>.tar.bz2`) to a temporary location.

   The following files should appear in the specified location:

```
sep_private_<x>_<y>_freebsd_x86_64_<build_number>.tar.bz2
    \sep-installer.sh
    \license.txt
    \README.txt
    \Installer_Overview.pdf
    \sep_private_<x>.<y>_freebsd_x86_64_<build_number>.tar.bz2
```

2. Untar `sep_private_<x>.<y>_freebsd_x86_64_<build_number>.tar.bz2` to a desired location. For example: `/opt/intel/sep`.

   These directories should appear in the specified location:

```
bin64
config
docs
include
lib64
sep_vars.sh
```

3. Navigate to the following directory: `cd /opt/intel/sep/sepdk/modules`.
4. Build the driver using the following command: `./build-driver -ni`.

   NOTE The user needs to have sudo or root access to install the drivers.
   ---

5. Install the drivers using the following command: `sudo ./kldload-sep -g <user_group>`. The driver will be accessible only to users under the group `<user_group>`. The default is `vtune`.

Uninstallation

To uninstall SEP/EMON manually from a FreeBSD* machine:

1. Navigate to the following directory: `cd /opt/intel/sep/sepdk/modules`.
2. Uninstall the drivers using the following commands: `sudo ./kldunload-sep`
3. Remove the install directory.

   For example: `rm -rf /opt/intel/sep*`.

macOS*

Use the following instructions to install or uninstall SEP/EMON manually on a macOS* machine.

Installation

To install SEP/EMON manually on an macOS* machine:

1. Untar the install package (`sep_private_<x>_<y>_darwin_x86_64_<build_number>.tar.bz2`) to a temporary location.

These files should appear in the specified location:

```
sep_private_<x>_<y>_darwin_x86_64_<build_number>.tar.bz2
    \sep-installer.sh
    \license.txt
    \README.txt
    \Installer_Overview.pdf
    \sep_private_<x>.<y>_darwin_x86_64_<build_number>.tar.bz2
```

2. Untar `sep_private_<x>.<y>_darwin_x86_64_<build_number>.tar.bz2` to a desired location.

For example: `/opt/intel/sep`.

These directories should appear in the specified location:

```
bin64
config
docs
include
lib64
sep_vars.sh
```

3. Navigate to the following directory: `cd /opt/intel/sep/bin`.
4. Install the drivers using the following command: `sudo ./kextload-sep`.

Uninstallation

To uninstall SEP/EMON manually from a macOS* machine:

1. Navigate to the following directory: `cd /opt/intel/sep/bin`.
2. Uninstall the drivers using the following command: `sudo ./kextunload-sep`.
3. Remove the install directory. For example: `rm -rf /opt/intel/sep*`.

Android*

Use the following instructions to install or uninstall SEP/EMON on an Android* machine.

Installation

On most of Intel-supplied reference builds, the required sampling drivers are pre-installed in one of the following directories:

- `/lib/modules`
- `/system/lib/modules`
- `/vendor/lib/module/`

If sampling drivers (`socperfx.ko, pax.ko, sepx.ko`) are not pre-installed, go through the steps below to build and install the drivers manually.

> **NOTE** Android* requires signed drivers. Every time the Android* kernel is built, a random private/public key is generated. Drivers must be signed with the random private key to be loaded. The drivers (`socperfx.ko, pax.ko, sepx.ko`) must be signed with the same key and be compiled against the same kernel headers/sources as installed on the Android* target system.

If the drivers are not pre-installed, you must build and install the sampling drivers manually and then install the binaries.

> **NOTE** If the drivers are pre-installed, you are ready to install the binaries (see the procedure for installing the binaries).

To build and install sampling drivers manually:

1. Build sampling drivers using the same Android* kernel source from the host Linux* system using the following command:

```
./build-driver --kernel-src-dir=<path>
```

2. Sign the drivers manually using the following command:

```
.$KERNEL_SRC/source/scripts/sign-file CONFIG_MODULE_SIG_HASH
$KERNEL_SRC/signing_key.priv $KERNEL_SRC/signing_key.x509 driver.ko
```

where the `CONFIG_MODULE_SIG_HASH` value is extracted from the `$KERNEL_SRC/.config` file.

3. Connect to the Android* device using `adb shell`, and then push the signed drivers to the target device.

4. Install drivers on the target using following commands:

```
insmod pax.ko
insmod socperfx.ko
insmod sepx.ko
```

After the drivers are in place, install the binaries on your Android* device from the Windows* or Linux* host system:

1. On the host system, create a directory where you want to install SEP.

For example:

- Windows* host: `C:/Program Files (x86)/IntelSWTools/sep.`
- Linux* host: `/opt/intel/sep.`

2. Extract the SEP install package into the appropriate directory:

- Windows*: `sep_private_<x>.<y>_win_<build_number>.zip`
- Linux*: `sep_private_<x>.<y>_linux_<build_number>.tar.bz2`

The following directories should appeart in the specified location:

```
bin64
config
tools
sep_Android*_install.cmd
sep_Android*_install.sh
sepdk
sep_vars.sh
```

3. Open a command prompt, and then navigate to the directory that you just created.

4. Install SEP binaries by running one of the following scripts from the Windows* or Linux* host.

Binaries are installed in `/data/sep` directory of the Android* device:

- Windows*: `sep_android_install.cmd`
- Linux*: `sep_android_install.sh`

5. Connect to the Android* device using `adb shell`.

6. Navigate to the `data/sep` directory.

For example: `cd /data/sep`.

7. Set up the SEP runtime environment by sourcing `sep_vars.sh`: `source ./sep_vars.sh`.

Uninstallation

If the drivers were manually installed, use the following steps to uninstall SEP/EMON manually from an Android* machine:

> **NOTE** If the drivers were not manually installed, skip to step 2.

1. Navigate to the installation directory and uninstall drivers using the following commands:

```
rmmod pax.ko
rmmod socperfx.ko
rmmod sepx.ko
```

2. Remove the install directory. For example: `rm -rf /data/sep*`.