Intel® Software Guard Extensions Data Center Attestation Primitives Installation Guide

For Linux* OS

Revision <1.0>

<2/2/2021>

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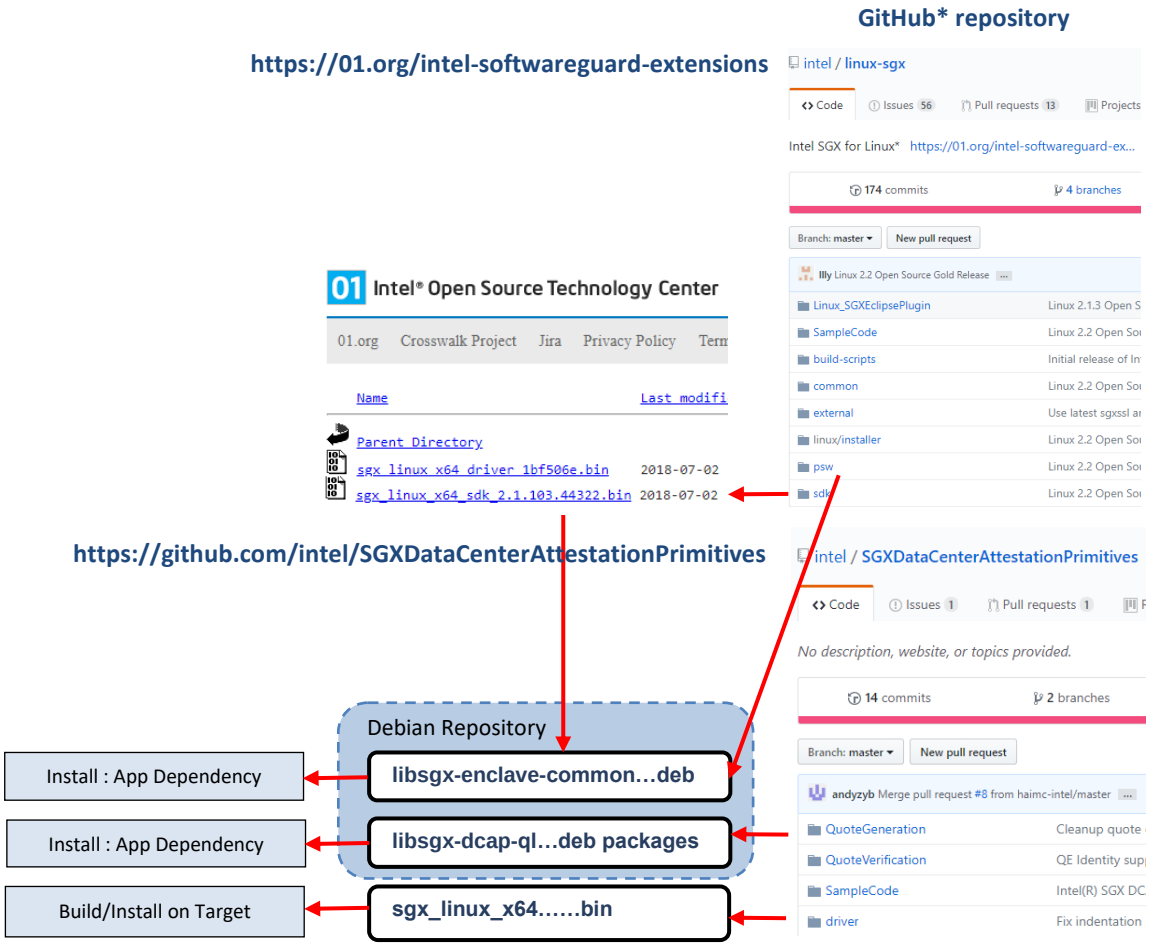
Introduction

This document describes installation of the Intel® Software Guard Extensions (Intel® SGX) Software Development Kit (SDK) and Platform Software (PSW) for Linux* OS and the Intel® SGX Data Center Attestation Primitives (Intel® SGX DCAP) for Linux* OS. The figure below illustrates the delivery flow of the software components from the source code on GitHub* to the builds of install packages, which you can download directly from https://01.org/intel-software-guard-extensions or from a Debian* repository located at https://download.01.org/intel-sgx/sgx_repo/ubuntu/.



Installation Instructions

The installation of the Intel® Software Guard Extensions (Intel® SGX) software packages for Linux* OS depends on the intended use. Choose the role that describes your needs best:

- **Intel SGX Application User**: you want to install an Intel SGX application, which runs an Intel SGX enclave on the system.
- **Intel SGX Application Developer**: you want to build or develop an Intel SGX application, which runs an Intel SGX enclave on the system.
- **Intel SGX Software Stack Developer or Builder**: you want to build or develop the Intel SGX Software Stack: The Intel SGX Software Development Kit (Intel SGX SDK), the Intel SGX Platform Software (Intel SGX PSW), or the Intel SGX Data Center Attestation Primitives (Intel SGX DCAP).

This section provides shortcuts on system configuration for the needs described above.

Intel® SGX Application User

To run an Intel® SGX Application built with the Intel SGX SDK, install appropriate versions of the Intel SGX Driver, the Intel SGX Platform Software (Intel SGX PSW), and, if used, the Intel SGX DCAP. To install the Intel SGX Platform Software, use the `libsgx-urts` Debian* package**.**

To configure the system to run an Intel SGX application:

On Ubuntu 16.04 and Ubuntu 18.04:

1. It's strongly recommended to update the system first:
   ```
   sudo apt update
   sudo apt upgrade
   ```

2. Install the Intel® SGX Driver package:
   a. Since the Intel SGX Driver is built from the driver package, install the required components that support the Intel SGX PSW installation.
   Note: This command line contains modules needed beyond the Intel SGX Driver installation.

   ```
   sudo apt-get install build-essential ocaml automake autoconf
   libtool wget python libssl-dev
   ```

   b. Download the latest Intel SGX Driver binary file from the Intel SGX DCAP download directory: https://download.01.org/intel-sgx/latest/dcap-latest/linux/distro
   For example, to download the driver for Ubuntu server 18.04, use the following command:
   `sudo wget - https://download.01.org/intel-sgx/latest/dcap-latest/linux/distro/ubuntu18.04-server/`

   c. Set the protections to allow for the .bin file execution:

   ```
   chmod 777 sgx_linux_x64_driver_1.32.bin
   ```

   d. Install the driver using the following command:

   ```
   sudo ./sgx_linux_x64_driver_1.32.bin
   ```

The installer also loads the Intel® SGX Driver and sets it to be `auto-load` when the system reboots.

After the Intel® SGX Driver installation, you can see a generated script `uninstall.sh` under the `/opt/intel/sgxdriver` directory. You can use this script to uninstall the driver.

e. (Optional)The enclave user needs to be added to the group of "sgx_prv" if customers want to use their own provision enclave:

sudo usermod -aG sgx_prv user

3. If you aim to install `sgx-dcap-pccs`, install `node.js` first with the following command because `sgx-dcap-pccs` depends on it:

```
curl -sL https://deb.nodesource.com/setup_14.x | sudo -E bash -
sudo apt-get install -y nodejs
```

Make sure the correct node version was installed(10.20 or later):

```
node --version
```

4. Install the DCAP packages (`libsgx-urts, libsgx-dcap-ql, libsgx-dcap-default-qpl, sgx-dcap-pccs)` with one of the following methods:
   a. Connect to the network and open a terminal

   b. Add the following repository to your sources:
      i. For Ubuntu* 16.04:
      ```
      echo 'deb [arch=amd64] https://download.01.org/intel-sgx/sgx_repo/ubuntu xenial main' | sudo tee /etc/apt/sources.list.d/intel-sgx.list
      ```
      ii. For Ubuntu* 18.04:
      ```
      echo 'deb [arch=amd64] https://download.01.org/intel-sgx/sgx_repo/ubuntu bionic main' | sudo tee /etc/apt/sources.list.d/intel-sgx.list
      ```

   c. Add a key to the list of trusted keys used by the apt to authenticate packages
   ```
   wget -qO - https://download.01.org/intel-sgx/sgx_repo/ubuntu/intel-sgx-deb.key | sudo apt-key add -
   ```

   d. Update the apt and install the latest package
   ```
   sudo apt-get update
   sudo apt-get install libsgx-urts libsgx-dcap-ql libsgx-dcap-default-qpl sgx-dcap-pccs
   ```

   Note: If you delete the config file of sgx-dcap-pccs package manually, you should use –purge to uninstall it instead of –remove :

   sudo –purge sgx-dcap-pccs

   e. **(Optional)** upgrade the packages using one of the following commands
   ```
   sudo apt-get upgrade
   sudo apt-get dist-upgrade
   ```
   To determine the best option for your system, consult the apt-get manual

f. **(Optional)** to debug with sgx-gdb, install the debug symbol package
For Ubuntu* 16.04, the debug symbols are included in the executable.
For Ubuntu* 18.04, the debug symbols are included in the following package
`sudo apt-get install libsgx-enclave-common-dbgsym libsgx-dcap-ql-dbgsym libsgx-dcap-default-qpl-dbgsym`

5. Setup the Intel® Software Guard Extensions Data Center Attestation Primitives (Intel® SGX DCAP) Provisioning Certificate Caching Service:

   By default, the debian package installer will guide you through the configuration of the PCCS service. If you are installing the rpm installer, the post-install script won't be executed automatically, and you need to run install.sh manually from the target directory. If you want to change the configuration later after installation was completed, please check https://github.com/intel/SGXDataCenterAttestationPrimitives/blob/master/QuoteGeneration/pccs/README.md

   You can run the following command to make sure the PCCS service is working correctly (assume the service is running on localhost with insecure certificate):

   ```
   curl -v -k -G
   "https://localhost:8081/sgx/certification/v3/rootcacrl"
   ```

   The root CA CRL should be retrieved successfully. If network error happens, please check your system's network settings to make sure you have access to PCCS service. For example, an incorrect proxy configuration may result in network errors.

   Important:

   1) If you are using insecure certificate for the PCCS service, after installed the `libsgx-dcap-default-qpl` package, please set "USE_SECURE_CERT"=FALSE in /etc/sgx_default_qcnl.conf
   2) It's recommended to delete old database first if you have installed a different version of PCCS before because the database may be not compatible.

6. By default, Architectural Enclave Service Manager (AESM) will be installed. If it is not needed, use "--no-install-recommends" option to avoid installing it. You can also disable it as below if it is installed:

   a. Stop the AESM service:

   ```
   sudo systemctl stop aesmd
   ```

   b. Disable the AESM Service. You can manually re-enable and restart it.

   ```
   sudo systemctl disable aesmd
   ```

   Note: The AESM Service provides the legacy Launch Control and EPID based attestation. Disable the AESM service if your system supports these services and/or you want to use them.

7. Upgrade from a legacy installation:
   Before release 2.8, SGX PSW is installed as a single package named as libsgx-enclave-common. Starting with the 2.8 release, SGX PSW is split into smaller packages. libsgx-enclave-common is one of them. As a result, a simple upgrade will end up with a subset of the SGX PSW being installed on

the system. You need to install additional packages to enable the required feature. At the same time, you will encounter some error message when you try to upgrade to release 2.8 from an old installation. You can use 2 methods to address it.

a. Uninstall the old installation first, then install new packages.

b. Add -o Dpkg::Options::="--force-overwrite" option to overwrite existing files and use “dist-upgrade” instead of "upgrade" to install new packages when upgrading. In short, you should use this command:

```
apt-get dist-upgrade -o Dpkg::Options::="--force-overwrite"
```

On Red Hat Enterprise Linux 8.1:

1. It’s strongly recommended to update the system first:
   ```
   sudo yum update
   sudo yum upgrade
   ```

2. Install the Intel® SGX Driver package:
   a. Since the Intel SGX Driver is built from the driver package, install the required components that support the Intel SGX PSW installation.
   Note: This command line contains modules needed beyond the Intel SGX Driver installation.

   ```
   sudo yum groupinstall 'Development Tools'

   sudo yum install ocaml ocaml-ocamlbuild wget python2 openssl-devel
   ```

   b. Download the latest Intel SGX Driver binary file from the Intel SGX DCAP download directory: https://download.01.org/intel-sgx/latest/dcap-latest/linux/distro

   c. Set the protections to allow for the .bin file execution:

   ```
   chmod 777 sgx_linux_x64_driver_1.32.bin
   ```

   d. Install the driver using the following command:

   ```
   sudo ./sgx_linux_x64_driver_1.32.bin
   ```

The installer also loads the Intel® SGX Driver and sets it to be `auto-load` when the system reboots.

After the Intel® SGX Driver installation, you can see a generated script `uninstall.sh` under the `/opt/intel/sgxdriver` directory. You can use this script to uninstall the driver.

e. (Optional)The enclave user needs to be added to the group of "sgx_prv" if customers want to use their own provision enclave:

sudo usermod -aG sgx_prv user

3. If you aim to install `sgx-dcap-pccs`, install `node.js` first with the following command because `sgx-dcap-pccs` depends on it:

```
curl -sL https://deb.nodesource.com/setup_14.x | sudo -E bash -
sudo yum install -y nodejs
```

Make sure the correct node version was installed(14.x):

```
node --version
```

4. Install the DCAP packages (`libsgx-urts, libsgx-dcap-ql, libsgx-dcap-default-qpl, sgx-dcap-pccs)` with one of the following methods:
   a. Connect to the network and open a terminal

   b. Download the DCAP packages to your client and install.

```
sudo rpm -ivh libsgx-enclave-common-[!d]*.x86_64.rpm libsgx-urts-[!d]*.x86_64.rpm libsgx-ae-pce-[!d]*.x86_64.rpm libsgx-ae-qe3-[!d]*.x86_64.rpm libsgx-ae-qve-[!d]*.x86_64.rpm libsgx-pce-logic-[!d]*.x86_64.rpm libsgx-qe3-logic-[!d]*.x86_64.rpm libsgx-dcap-ql-[!d]*.x86_64.rpm libsgx-dcap-default-qpl-[!d]*.x86_64.rpm sgx-dcap-pccs-[!d]*.x86_64.rpm
```

Note: For Intel SGX DCAP1.10 and older releases, if you are upgrading the sgx-dcap-pccs package, you should uninstall the old version first, and then install the new version. If you do not uninstall the PCCS first, then the PCCS service will not be available. To recover from this state, users need to uninstall and install again. The uninstall will not delete the older PCCS version's database. Once you install the new version, all data will be restored.

Note: Upgrading from a v1.8- to v1.9+, however, will not recovery the database properly. Before upgrading from v1.8, you should follow the manual migration sequence.

   c. **(Optional)** to debug with sgx-gdb, install the debug symbol package

```
sudo rpm -ivh libsgx-enclave-common-debuginfo*.rpm libsgx-urts-debuginfo*.rpm libsgx-pce-logic-debuginfo*.rpm libsgx-qe3-logic-debuginfo*.rpm libsgx-dcap-ql-debuginfo*.rpm libsgx-dcap-default-qpl-debuginfo*.rpm
```

5. Setup the Intel® Software Guard Extensions Data Center Attestation Primitives (Intel® SGX DCAP) Provisioning Certificate Caching Service:

   Once the RPM package was installed, you can run the script `install.sh` in the installation directory to configure the PCCS service. If you want to do manual configuration, please check https://github.com/intel/SGXDataCenterAttestationPrimitives/blob/master/QuoteGeneration/pccs/README.md

   You can run the following command to make sure the PCCS service is working correctly (assume the service is running on localhost with insecure certificate) :

```
curl --noproxy "*" -v -k -G
"https://localhost:8081/sgx/certification/v3/rootcacrl"
```

The root CA CRL should be retrieved successfully.

Important:

If you are using insecure certificate for the PCCS service, after installed the `libsgx-dcap-default-qpl` package, please set "USE_SECURE_CERT"=FALSE in /etc/sgx_default_qcnl.conf

Intel® SGX Application Developer

In addition to installing the Intel® Software Guard Extensions Platform Software (Intel® SGX PSW), you should also install the Intel® SGX Software Development Kit (Intel® SGX SDK) and the prerequisite software. To install the Intel SGX SDK:

1. Install the prerequisite software. For more information about prerequisites, see *Install the Intel® SGX SDK*: *Prerequisites*: https://github.com/intel/linux-sgx/blob/master/README.md.
   Run the following command:
   On Ubuntu 16.04 and Ubuntu 18.04:
   ```
   sudo apt-get install build-essential python
   ```
   On Red Hat Enterprise Linux 8.1:
   ```
   sudo yum groupinstall 'Development Tools'
   sudo yum install python2
   ```
2. Download the Intel SGX SDK and install it.
   Note: The following commands are specific to the Linux* 2.3 release. For subsequent releases, specify a new release directory and a filename.
   a. In the following command line, specify the Intel SGX DCAP version (for example, `1.0`), the operation system and its version (for example, `ubuntu16.04`), the Intel SGX SDK version (for example, `2.3.100`), the build (for example, `46354`), and run the command:
   ```
   wget - https://download.01.org/intel-sgx/latest/dcap-latest/<OS>/distro/<OS_version>/sgx_linux_x64_sdk_<version>.<build>.bin
   ```
   b. Adjust the file permissions:
   ```
   chmod +x sgx_linux_x64_sdk_2.3.100.46354.bin
   ```
   c. Start interactive setup by running the following command (run with sudo if necessary):
   ```
   $ ./sgx_linux_x64_sdk_2.3.100.46354.bin
   ```

d. When the question **Do you accept this license? [yes/no]** appears, type **yes** and press **Enter** to continue.
e. When the question **Do you want to install in current directory? [yes/no]** appears, choose one of the following:
    - If you want to install the components in the current directory, type **yes** and press **Enter.**
    - If you want to provide another path for the installation, type **no** and press **Enter**.

    Now the Intel SGX SDK package is installed into the directory `[Your Input Location]/sgxsdk`. In this location you can also find a generated script `uninstall.sh`, which you can use to uninstall the Intel SGX SDK.

f. To set all environment variables, run:

```
source [User Input Path]/sgxsdk/environment
```

3. Install the appropriate developer packages ***libsgx-enclave-common-dev***, ***libsgx-dcap-ql-dev and*** other related packages with one of the following methods

On Ubuntu 16.04 and Ubuntu 18.04:

```
sudo apt-get install libsgx-enclave-common-d* libsgx-dcap-ql-d*
libsgx-dcap-default-qpl-d*
```

On Red Hat Enterprise Linux 8.1:

```
sudo rpm -ivh libsgx-enclave-common-*.x86_64.rpm libsgx-urts-
*.x86_64.rpm libsgx-ae-pce-*.x86_64.rpm libsgx-ae-qe3-*.x86_64.rpm
libsgx-ae-qve-*.x86_64.rpm libsgx-pce-logic-*.x86_64.rpm libsgx-qe3-
logic-*.x86_64.rpm libsgx-dcap-ql-*.x86_64.rpm libsgx-dcap-default-
qpl-*.x86_64.rpm sgx-dcap-pccs-*.x86_64.rpm
```

Building the Intel® SGX Software Stack

Intel® SGX - Platform Software and Software Development Kit

The source code for the Intel® Software Gurad Extensions Platform Software (Intel® SGX PSW) and the Intel® Software Guard Extensions Software Development Kit (Intel® SGX SDK) is located in the following GitHub* repository: https://github.com/intel/linux-sgx . To build and deploy the packages, follow the instructions detailed in https://github.com/intel/linux-sgx/blob/master/README.md.

Prebuilt Binaries

To run Intel® SGX enclaves on systems that do not support the Flexible Launch Control and to properly provision and use the EPID attestation, you must build specific enclaves and sign them using Intel® applications. You can download these pre-built enclaves for the Intel® SGX Linux* 2.3 release from https://download.01.org/intel-sgx/linux-2.3/prebuilt_ae_2.3.tar.gz.

In addition, the Intel SDK provides prebuilt optimized libraries in the binary form. You can get these libraries from https://download.01.org/intel-sgx/linux-2.3/optimized_libs_2.3.tar.gz.

Check the SHA256 hash of downloaded libraries using https://download.01.org/intel-sgx/linux-2.3/SHA256SUM_prebuilt_2.3.txt.

Intel® SGX Data Center Attestation Primitives

The source code for the Intel® Software Guard Extensions Data Center Attestation Primitives (Intel® SGX DCAP) is located in the following GitHub* repository: https://github.com/intel/SGXDataCenterAttestationPrimitives. To build and deploy the packages, follow the instructions detailed in https://github.com/intel/SGXDataCenterAttestationPrimitives/blob/master/README.md.

Prebuilt Binaries

To use the Intel SGX DCAP, you must sign specific enclaves using Intel® applications. This includes enclaves used by the Intel® SGX DCAP Quote Generation Library, which are locates here: https://download.01.org/intel-sgx/sgx-dcap/1.5/linux/prebuilt_dcap_1.5.tar.gz. For release notes and other details, see https://01.org/intel-softwareguard-extensions/downloads/intel-sgx-dcap-linux-1.5-release.

Intel® Software Guard Extensions - Software Packages

Intel® SGX Software Development Kit for Linux* OS

The Intel® Software Guard Extensions Software Development Kit (Intel® SGX SDK) for Linux* OS provides libraries, tools, reference code, and documentation that help you code, build, and sign Intel SGX enclaves and the applications that host Intel SGX enclaves.

The Intel® SGX SDK installation is provided as a binary file:

- Location: https://download.01.org/intel-sgx/ `linux-<version>/<OS><OS version>`
- Filename: `sgx_linux_x64_sdk_<version>.<build>.bin`

Dependencies

- `build-essential`
- `python`
- `libsgx-urts and other SGX packages (required by sample code)`

See *Install the Intel® SGX SDK*: *Prerequisites* here: https://github.com/intel/linux-sgx/blob/master/README.md.

Source

Source code for the Intel® SGX SDK for Linux* OS is located on GitHub*:

- Source code: https://github.com/intel/linux-sgx.
- Build instructions: https://github.com/intel/linux-sgx/blob/master/README.md. This document contains detailed instructions on platform configuration and build procedures for the Intel SGX SDK and the Intel SGX PSW for Linux* OS.
- Build dependencies: https://github.com/intel/linux-sgx/blob/master/README.md. This document defines installation prerequisites and build dependencies.

Intel® SGX Platform Software

The Intel SGX Platform Software (Intel SGX PSW) for Linux* OS mainly contains uRTS, Enclave Common API and the Architectural Enclave Service Manager (AESM) in different packages.

The Intel® SGX PSW is provided as several Debian* packages for Ubuntu 16.04 and Ubuntu 18.04:

- Location:
    - The Debian* repository: https://download.01.org/intel-sgx/sgx_repo/ubuntu/.

    - Packages:
        - https://download.01.org/intel-sgx/sgx_repo/ubuntu/pool/main/libs/libsgx-*
        - https://download.01.org/intel-sgx/sgx_repo/ubuntu/pool/main/libs/sgx-aesm-service/
- Filename: `libsgx-*_${version}-${revision}-${os}_${arch}.deb`
  `sgx_aesm_service_${version}-${revision}-${os}_${arch}.deb`

The Intel® SGX PSW is provided as several RPM packages for Red Hat Enterprise Linux 8.1:

- Location:
    - Packages (including special developer packages):
        - https://download.01.org/intel-sgx/latest/dcap-latest/linux/distro/rhel8.2-server
- Filename: `libsgx-*-${version}-${release}-${arch}.rpm`
  `sgx_aesm_service-${version}-${release}-${arch}.rpm`

Dependencies

The Intel® SGX Platform Software depends on the following modules:

- `libc6`
- `libcurl3`
- `libgcc1`
- `libprotobuf9v5`
- `libssl1.0.0`
- `libstdc++6`

See *Install the Intel® SGX PSW*: *Prerequisites* here: https://github.com/intel/linux-sgx/blob/master/README.md.

Source

Source code for the Intel SGX Platform Software is located in the same GitHub* repository where the Intel SGX SDK for Linux* OS is stored:

- Source code : https://github.com/intel/linux-sgx.
- Build instructions: https://github.com/intel/linux-sgx/blob/master/README.md. This document contains detailed instructions on platform configuration and build procedures for the Intel SGX PSW and the Intel SGX SDK.
- Build dependencies: see https://github.com/intel/linux-sgx/blob/master/README.md. This document defines installation prerequisites and build dependencies.

Intel® SGX Data Center Attestation Primitives

The Intel ® SGX Data Center Attestation Primitives (Intel® SGX DCAP) contains the following components:

1. Intel® SGX DCAP Quote Generation Library, which is used to generate quotes from the attester.
2. Intel® SGX DCAP Default Quote Provider Library, which is used to retrieve PCK certificates from Provisioning Certificate Caching Service (PCCS).
3. Intel® SGX DCAP Provisioning Certificate Caching Service, which is a caching server for Intel PCS
4. Intel® SGX DCAP Quote Verification Library, which the attestee uses to verify quotes.
5. Intel® SGX Driver. This is an out-of-tree driver, which runs on systems that support the Launch Control Configuration.

Intel® SGX DCAP Quote Generation Library

The components of the Intel® SGX DCAP Quote Generation Library are provided in a Debian* package for Ubuntu 16.04 and Ubuntu 18.04:

- Location:
  - The Debian* repository: https://download.01.org/intel-sgx/sgx_repo/ubuntu/.
  - Packages (including separate developer and debugger packages):
    - https://download.01.org/intel-sgx/sgx_repo/ubuntu/pool/main/libs/libsgx-dcap-ql/
    - https://download.01.org/intel-sgx/sgx_repo/ubuntu/pool/main/libs/libsgx-dcap-ql-dev/
    - https://download.01.org/intel-sgx/sgx_repo/ubuntu/pool/main/libs/libsgx-dcap-ql-dbg/
  - Intel® SGX DCAP release directory that also contains packages: https://01.org/intel-softwareguard-extensions/.
- Filename: `libsgx-dcap-ql_${version}-${revision}-${os}_${arch}.deb`

The components of the Intel® SGX DCAP Quote Generation Library are provided in a RPM package for Red Hat Enterprise Linux 8.1, which are all packaged in a local PRM repository:

- Location:
  - The local RPM repository: https://download.01.org/intel-sgx/latest/dcap-latest/linux/distro/rhel8.2Intel® SGX DCAP release directory that also contains packages: https://01.org/intel-softwareguard-extensions/.
- Filename: `libsgx-dcap-ql-${version}-${release}-${arch}.rpm`

Dependencies

The Intel® SGX Data Center Attestation Primitives depend on the following modules:

- `libsgx-qe3-logic, libsgx-pce-logic and libsgx-ae-qve`

Source

The source code is in the following repository:

- Source Code : https://github.com/intel/SGXDataCenterAttestationPrimitives/tree/master/QuoteGeneration
- Build instructions and dependencies: https://github.com/intel/SGXDataCenterAttestationPrimitives/blob/master/QuoteGeneration/README.md. This document also provides instructions on including the prebuilt or signed enclaves.

Intel® SGX DCAP Default Quote Provider Library

The components of the Intel® SGX DCAP Default Quote Provider Library are provided in a Debian* package for Ubuntu 16.04 and Ubuntu 18.04:

- Location:
  - The Debian* repository: https://download.01.org/intel-sgx/sgx_repo/ubuntu/.
  - Packages:
    - https://download.01.org/intel-sgx/sgx_repo/ubuntu/pool/main/libs/libsgx-dcap-default-qpl/
  - Intel® SGX DCAP release directory that also contains packages: https://01.org/intel-softwareguard-extensions/.
- Filename: `libsgx-dcap-default-qpl_${version}-${revision}-${os}_${arch}.deb`

The components of the Intel® SGX DCAP Default Quote Provider Library are provided in RPM package for Red Hat Enterprise Linux 8.1, which are packaged in a local RPM repository:

- Location:
  - The local RPM repository:
    - https://download.01.org/intel-sgx/latest/dcap-latest/linux/distro/rhel8.2-server/sgx_rpm_local_repo.tgz
  - Intel® SGX DCAP release directory that also contains packages: https://01.org/intel-softwareguard-extensions/.
- Filename: `libsgx-dcap-default-qpl-${version}-${release}-${arch}.rpm`

Source

The source code is in the following repository:

- Source Code : https://github.com/intel/SGXDataCenterAttestationPrimitives/tree/master/QuoteGeneration/qpl/

- Build instructions and dependencies: https://github.com/intel/SGXDataCenterAttestationPrimitives/blob/master/QuoteGeneration/qpl/README.md

Intel® SGX DCAP Provisioning Certificate Caching Service

The components of the Intel® SGX DCAP Provisioning Certificate Caching Service are provided in a Debian* package for Ubuntu 16.04 and Ubuntu 18.04:

- Location:
  - The Debian* repository: https://download.01.org/intel-sgx/sgx_repo/ubuntu/.
  - Packages:
    - https://download.01.org/intel-sgx/sgx_repo/ubuntu/pool/main/web/sgx-dcap-pccs/
  - Intel® SGX DCAP release directory that also contains packages: https://01.org/intel-softwareguard-extensions/.
- Filename: `sgx-dcap-pccs_${version}-${revision}-${os}_${arch}.deb`

The components of the Intel® SGX DCAP Provisioning Certificate Caching Service are provided in a RPM package for Red Hat Enterprise Linux 8.1, which are all packaged in a local PRM repository:

- Location:
  - The local RPM repository:
    - https://download.01.org/intel-sgx/latest/dcap-latest/linux/distro/rhel8.2-server/sgx_rpm_local_repo.tgz
  - Intel® SGX DCAP release directory that also contains packages: https://01.org/intel-softwareguard-extensions/.
- Filename: `sgx-dcap-pccs-${version}-${release}-${arch}.rpm`

Source

The source code is in the following repository:

- Source Code : https://github.com/intel/SGXDataCenterAttestationPrimitives/tree/master/QuoteGeneration/pccs/
- Install instructions and dependencies: https://github.com/intel/SGXDataCenterAttestationPrimitives/blob/master/QuoteGeneration/pccs/README.md

Intel® SGX DCAP Quote Verification Library

The components of the Intel® SGX DCAP Quote Verification Library are provided in a Debian* package for Ubuntu 16.04 and Ubuntu 18.04:

- Location:
  - The Debian* repository: https://download.01.org/intel-sgx/sgx_repo/ubuntu/.
  - Packages (including separate developer and debugger packages):
    - https://download.01.org/intel-sgx/sgx_repo/ubuntu/pool/main/libs/libsgx-dcap-quote-verify/
    - https://download.01.org/intel-sgx/sgx_repo/ubuntu/pool/main/devel/libsgx-dcap-quote-verify-dev/
    - https://download.01.org/intel-sgx/sgx_repo/ubuntu/pool/main/debug/libsgx-dcap-quote-verify-dbgsym/
  - Intel® SGX DCAP release directory that also contains packages: https://01.org/intel-softwareguard-extensions/.
- Filename: `libsgx-dcap-quote-verify_${version}-${revision}-${os}_${arch}.deb`

The components of the Intel® SGX DCAP Quote Verification Library are provided in a RPM package for Red Hat Enterprise Linux 8.1, which are all packaged in a local PRM repository:

- Location:
  - The local RPM repository:
    - https://download.01.org/intel-sgx/latest/dcap-latest/linux/distro/rhel8.2-server/sgx_rpm_local_repo.tgz
  - Intel® SGX DCAP release directory that also contains packages: https://01.org/intel-softwareguard-extensions/.
- Filename: `libsgx-dcap-quote-verify-${version}-${release}-${arch}.rpm`

Upgrade from a legacy installation

Before the Intel® SGX DCAP 1.8 release, Intel® SGX DCAP quote verification library is part of quote generation library libsgx-dcap-ql. Starting with the Intel® SGX DCAP 1.8 release, Intel® SGX DCAP quote verification library is a standalone package named libsgx-dcap-quote-verify. As a result, a simple upgrade will end up with a subset of the Intel® SGX DCAP quote generation/verification being installed on the system. To enable the required feature, you need to install additional packages. At the same time, you will encounter several error messages when you try to upgrade to the Intel® SGX DCAP 1.8 from an old installation. To address the issue, choose any of the methods below:

- Uninstall the old installation and install new packages.
- Add -o Dpkg::Options::="--force-overwrite" option to overwrite existing files and use "dist-upgrade" instead of "upgrade" to install new packages when upgrading. To perform these actions, use the following command:

  $ sudo apt-get dist-upgrade -o Dpkg::Options::="--force-overwrite"

Dependencies

The Intel® SGX DCAP quote verification package has **recommended** dependency on the following modules.

- `libsgx-urts and libsgx-ae-qve`

Note that you can ignore the dependencies if you want to use quote verification library on non-SGX system.

- On Ubuntu 16.04 and Ubuntu 18.04:

  --no-install-recommends

  Note

  On .rpm-based system, rpmbuild>=4.12 is required to enable similar features.

SGX ECDSA Quote verification depends on verification collateral. So if user doesn't install/configure Quote provider library and PCCS, he/she can install Intel's "libsgx-dcap-default-qpl" and PCCS, see section "Intel ® SGX DCAP Default Quote Provider Library" and "Intel ® SGX DCAP Provisioning Certificate Cache Service".

Source

The source code is in the following repository:

- Source Code : https://github.com/intel/SGXDataCenterAttestationPrimitives/tree/master/QuoteVerification
- Build instructions and dependencies: https://github.com/intel/SGXDataCenterAttestationPrimitives/blob/master/QuoteVerification/README.md

Intel® SGX Driver

The Intel® SGX Driver for Linux* OS is provided for distributions that run on systems supporting the Launch Control Configuration.

- Location: https://download.01.org/intel-sgx/ dcap-<version> for dcap-1.0, the location is https://download.01.org/intel-sgx/dcap-1.0/
- Filename (for version 1.0): sgx_linux_x64_driver_license_updated_dcap_a06cb75.bin.

Dependencies

The Intel® SGX Driver for Linux* OS depends on the following:

- `build-essential`

- `ocaml`
- `automake`
- `autoconf`
- `libtool`
- `wget`
- `python`
- `libssl-dev`

Source

The source code is located on GitHub*:

- Source code: https://github.com/intel/SGXDataCenterAttestationPrimitives/tree/master/driver
- Build instructions and dependencies: https://github.com/intel/SGXDataCenterAttestationPrimitives/blob/master/driver/linux/README.md.

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