

Intel® ESQ for Intel® AI Edge Systems

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The Intel® Edge System Qualification (Intel® ESQ) enables you to test your platform for a specific Intel® Edge Software package using a command line interface tool.

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Overview

The Intel® ESQ for Intel® AI Edge Systems enables customers to run Intel-provided test modules on their target system, allowing them to qualify their platform as an edge AI-ready device. The edge AI silicon portfolio is organized into the following tiers, and the recommended configurations are documented in the system requirements. Appropriate test modules are run depending on the tier.

For more information, see [Edge AI Systems from Intel](#).

Reference Edge AI Systems

The reference edge systems are organized along the following tiers:

- Efficiency-optimized edge AI enhances AI performance with integrated CPUs, GPUs, and NPUs, ideal for low power while maximizing potential performance.
- Scalable performance edge AI delivers adaptable AI performance with a built-in AI accelerator and the option to add a discrete GPU of your choice, including Intel GPUs.
- Mainstream and entry-edge AI offer a balance between computing, inferencing, total cost of ownership, and low power.

Intel conducted extensive testing and documented the results and the methodology in Verified Reference Blueprints (VRBs). For more information, see [VRBs](#).

System Requirements

Scalable Performance Edge AI

CPU	13th generation Intel®		
Generation	Core™ processor or higher		
SKU	Dual Socket	Single Socket	Intel® Core™ i7 or higher

TDP 250 watts 32 cores minimum 8 Performance-cores (or P-

cores) minimum

32 cores minimum TDP 250 watts

TDP 65 watts

AI Features: Intel® Advanced Matrix AI Features: Intel

Extensions (Intel® AMX) and Intel® AMX and Intel AI Features: Intel® Advanced

Advanced Vector Extensions 512 AVX-512 Vector Extensions 2 (Intel®

(Intel® AVX-512) AVX2)

Minimum 256 GB

System Minimum 512 GB DDR5 at 5600 MT/sDDR5 at 5600 Minimum 64 GB DDR5
Memory (1DPC)

MT/s (1DPC)

Intel® Data Center GPU Flex Series 140, Intel® Data

Intel Arc A380 GPU, Intel Arc

Discrete Center GPU Flex Series 170, Intel® Arc™ A380 GPU,

GPU A380E GPU, Intel Arc A750

Intel® Arc™ A380E GPU, Intel® Arc™ A750 GPU, Intel®

GPU, Intel Arc A770 GPU Arc™ A770 GPU

Efficiency Optimized Edge AI

CPU

Intel® Core™ Ultra processor Series 1 or Series 2

Generation

Intel® Core™ Ultra 5 processor or higher, iGPU with 7 Xe-cores or more

SKU TDP 28 watts

AI Features: Intel AVX2

System

Minimum 32 GB DDR5

Memory

Mainstream and Entry Edge AI

CPU

14th generation Intel Core processors or higher

Generation

Intel Core i7 processor or higher, 8 P-cores minimum

SKU TDP 65 watts

AI Features: Intel AVX2

System

Minimum 64 GB DDR5 Memory

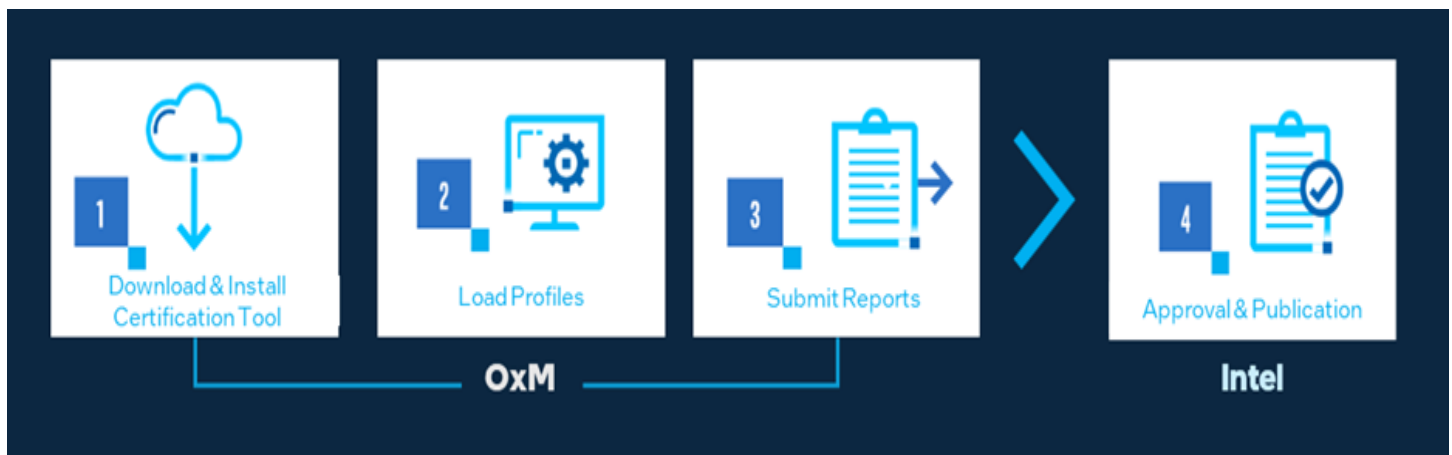
Recommended Settings for Secure Boot and Performance

Each system configuration may require a specific secure boot and performance configuration. To learn more about BIOS settings, visit [Intel AI Edge Systems VRB](#), and then select a VRB configuration that corresponds to the target platform.

How It Works

This four-step qualification process is designed to be straightforward and user friendly, allowing system manufacturers and integrators to efficiently validate their systems and ensure they are ready for deployment in the market. The qualification not only provides assurance of the system's quality and reliability but also enhances its credibility among users and within the broader ecosystem. The following is an overview. For more details, see the [Get Started Guide](#).

Intel ESQ for Intel AI Edge Systems



Step 1: Download and Install the Qualification Tool

The first step requires registering and downloading the qualification tool. After downloading the app, you must install the qualification tool on the system intended for certification.

Step 2: Run the Qualification Tool

Once the qualification tool is installed, the next step is to run the program. This involves initiating a series of automated tests that assess various aspects of the system's hardware and software.

Step 3: Submit Report

Upon completion of the tests, the qualification tool generates a report detailing the system's performance and compatibility results. Submit the report to Intel for approval by emailing intel.edge.ai.systems@intel.com.

Step 4: Publish

Once approved, the newly qualified system is published on the [Recommended Systems](#).

Get Started

Prerequisites

1. Install [Ubuntu* Desktop 22.04](#) on the target system.

Note Ubuntu 22.04.3 LTS is preferred for Intel® Core™ and Intel® Core™ Ultra processors. Ubuntu 22.04.4 LTS Server is preferred for Intel® Xeon® processors.

2. Install the required drivers with the corresponding Intel AI Edge Systems configuration as mentioned in the [VRB guidelines](#).

To speed up system driver and library installation, go to [Edge Developer Kit Reference Scripts](#), and then select the appropriate scripts for the target platform.

3. Install required runtime libraries and packages.

```
sudo apt-get install libnuma-dev python3-dev jq
```

4. Set up the Hugging Face* token before running Intel ESQ.

- Enable Hugging Face. For instructions, refer to the step-by-step guide in the [Appendix](#).
- If the default Hugging Face server is not accessible, you may configure an alternative mirror by referring to the step-by-step guide in the [Appendix](#).
- Export the Hugging Face token copied in your terminal. Ensure a similar terminal is used to run the application.

```
export HF_TOKEN=<your-huggingface-token>
```

5. Set up Docker*. Refer to the [official Docker documentation](#):

- Follow steps 1–3 under [Install Using apt Repository](#).
- To configure nonroot use for Docker, follow steps 1–4 under [Manage Docker as a Nonroot User](#).

6. If you are using Ubuntu 24.04.3 LTS, upgrade python-venv to python3.12-venv. `sudo apt install`

```
python3.12-venv
```

7. If you are using Ubuntu 22.04.4 LTS Server operating system, install unzip.

```
sudo apt-get install unzip
```

Install the Package

1. To get the qualification tool, go to the [Software Catalog page](#), select your options, and then select Download.

Intel® ESQ for Intel® AI Edge Systems

The Intel® Edge System Qualification (Intel® ESQ) is a software package designed to help customers evaluate the performance of AI applications on their specific hardware systems. By running these benchmarks, partners can assess whether their platforms meet the standards required to be qualified as Intel® AI Edge...

Select options below to download

Version or Tag	☐ ESQ 11.2.3 - Intel AI Edge Systems ☐ ESQ 11.2.2 - Intel AI Edge Systems
Target System	☐ Ubuntu 24.04 LTS ☐ Ubuntu 22.04 LTS
Distribution	☒ Recommended Configuration

Available with your selection 

 [Documentation](#)

[Download](#)

Intel® ESQ for Intel® AI Edge Systems

Target System	Version	Distribution	
Ubuntu 24.04 LTS	ESQ 11.2.3 - Intel AI Edge	Recommended Config	Edit

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Downloaded Intel® ESQ for Intel® AI Edge Systems

Product Key.

58be1ed2-c003-4775-9144-911a91f8cb7

You will be prompted to enter your product key during installation.

Get Started with Intel® ESQ for Intel® AI Edge Systems

Once your download is complete, copy the zip file to your target system and install it

Step 1: Prepare your target system with the target OS.

Step 2: Copy the zip file to your target system.

Step 3: Extract and install the software.

See the [Get Started Guide](#) for detailed instructions.

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Decline

Accept

2. Accept the license agreement and copy the product key.
3. Transfer the downloaded package to the target Ubuntu system and unzip it:

```
unzip edge_system_qualification.zip
```

4. Once the package has been extracted, enter `edge_system_qualification`, and then change `edgesoftware` software permissions.

```
cd edge_system_qualification
chmod +x edgesoftware
```

5. If you are installing the software on Ubuntu 24.04.3 LTS, create a virtual environment variable.

```
python3 -m venv venv
```

6. During the installation process, you are prompted to enter the product key. This is the key you copied in step 2. The same product key for this software should be included in the confirmation email you received during download.

```
./edgesoftware install
```

7. Restart the system when the message Installation of package complete appears with the installation status for each module.

Run the Intel ESQ Application

Note Before running Intel ESQ, ensure the qualification tool is downloaded and installed.

1. To run Intel ESQ as a complete test suite using the command line interface (CLI), change the directory to the location of the Intel ESQ folder:

```
cd ~/esq
```

2. Check the Intel ESQ version:

```
esq --version
```

Ensure the released version matches the version you downloaded. For example: Version: 11.2.0

3. To view the available CLI option, run the following:

```
esq --help
```

4. To list the available test modules, run the following:

```
esq module list
```

Note The system test module is a predistributed test module in the Intel ESQ.

6. Run the qualification test.

Note We recommend running Intel ESQ as a non-root user.

```
esq --verbose run
```

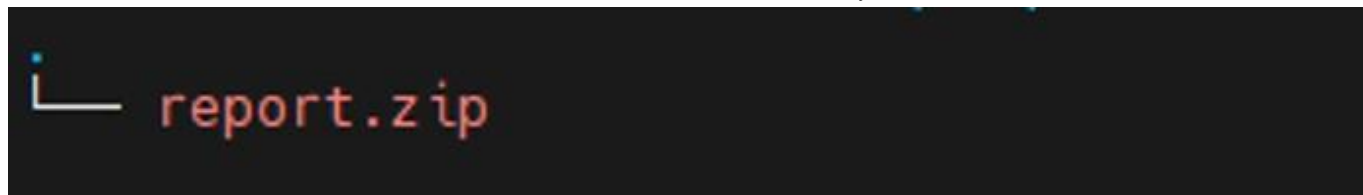


```
~/esq$ esq --verbose run
No specific modules provided, running all modules
Running module 1/2: system
Executing module with command: ./run.sh
Loading hardware csv file
Loading software csv file
Retrieving all system details
Verifying all dependencies
Retrieving all hardware information
Retrieving all software information
-----
Device Vendor:
Processor: Intel(R) Core(TM) Ultra 5 225H
Graphics Processing Units (GPU): Intel Corporation Arrow Lake-P [Intel Graphics]
ASPEED Technology, Inc. ASPEED Graphics Family
OS Version: Ubuntu 24.04.2 LTS
-----
Creating result file
Result file created as 'result.json'
Verifying the result
Running module 2/2: ai-edge-system
Executing module with command: /bin/sh -c "python3 -m venv .venv && . .venv/bin/activate
```

7. After the test run of the test module is finished, the CLI displays the location of the generated report. Navigate to the Reports folder.

```
cd reports
```

8. The report directory displays as shown in the following image:



9. Test results are stored in the output folder. Intel ESQ generates a complete test report in HTML format and detailed logs packaged as one ZIP file, which you can email to the [Intel ESQ support team](#).

Support

System manufacturers seeking tuning support for Intel AI Edge Systems or inquiries about verified reference blueprints can email intel.edge.ai.systems@intel.com.

Appendix

Enable Intel® Data Center GPU

We recommend that original equipment manufacturers (OEMs) complete the [Intel® Data Center GPU Verified System Library program](#) for data center systems designed with Intel Data Center GPUs. This verification process allows customers to validate the functionality of the system for production use. It also provides end-user assurance of system quality before running Intel ESQ tests.

[List of Servers Enabled with Intel® Data Center GPU Flex Series](#)

Enable Hugging Face*

This guide walks you through the process of generating a Hugging Face access token and enabling relevant repository access on Hugging Face.

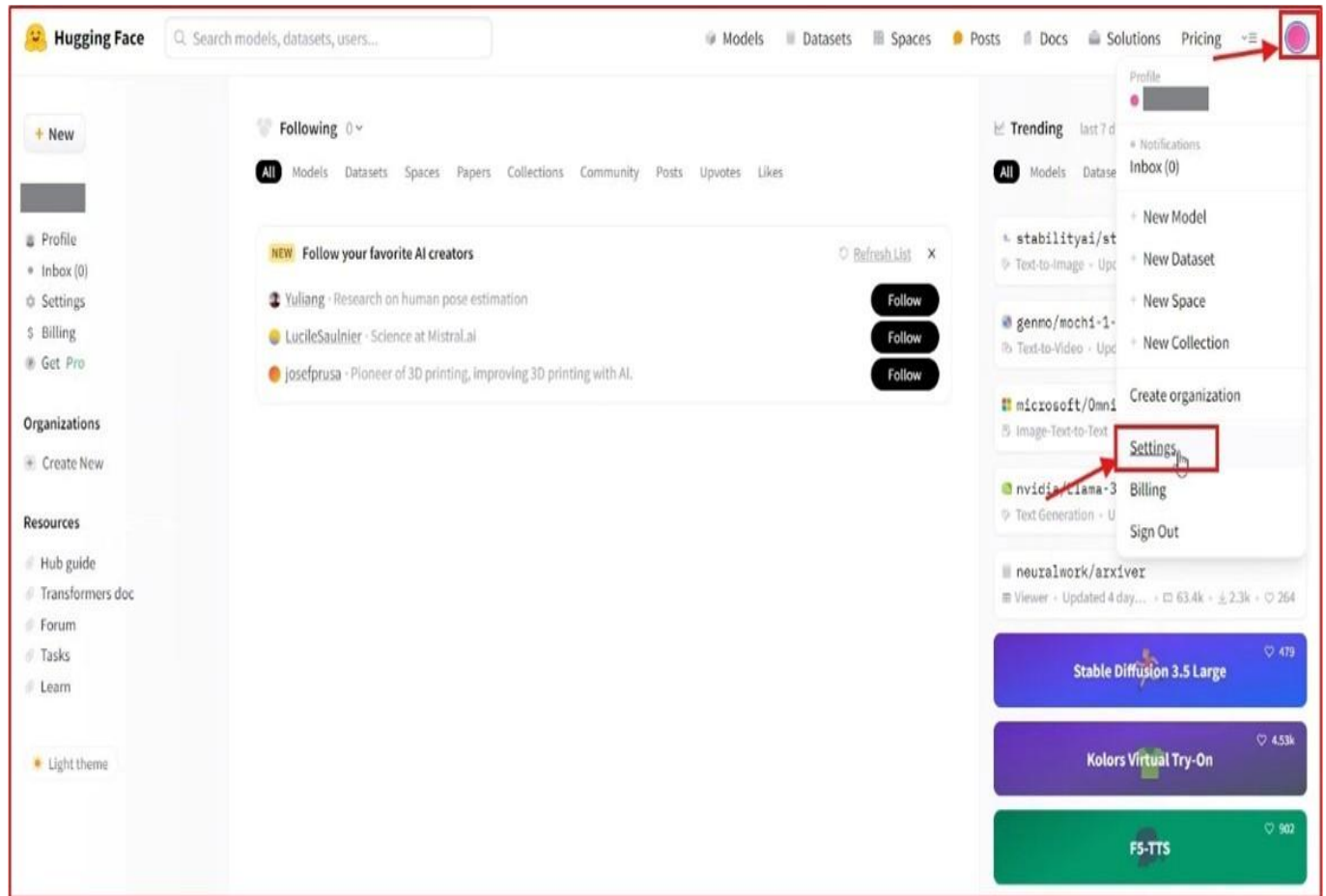
Generate Hugging Face Access Token Step

1: Create a Hugging Face Account

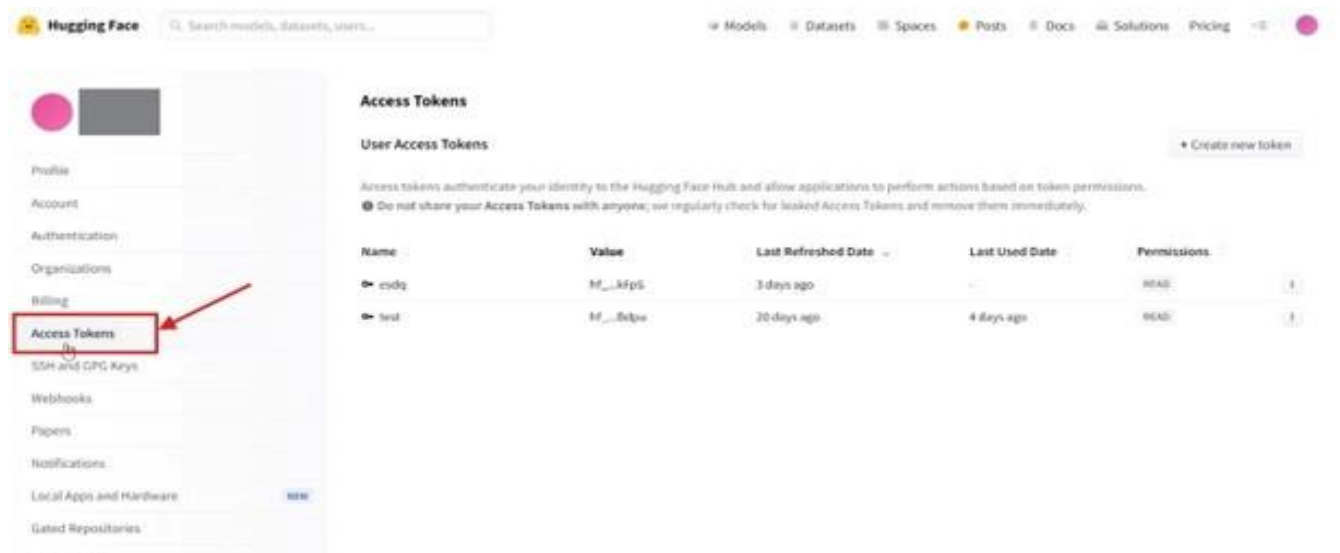
1. Go to [Hugging Face](#).
2. Sign up or sign in:
 - If you don't have an account, select Sign Up and follow the instructions to create one.
 - If you already have an account, select Log In and enter your credentials.

Step 2: Generate an [Access Token](#)

1. After you sign in, select your profile picture or username in the top-right corner to open the menu.
2. From the menu, select Settings.



3. In the Settings menu, select Access Tokens.



4. Select Create new token.

Hugging Face Search models, datasets, users...

Models Datasets Spaces Posts Docs Pricing

Access Tokens

User Access Tokens

Access tokens authenticate your identity to the Hugging Face Hub and allow applications to perform actions based on token permissions. ⚠️ Do not share your Access Tokens with anyone; we regularly check for leaked Access Tokens and remove them immediately.

Name	Value	Last Refreshed Date	Last Used Date	Permissions
test	hf_...Bdpu	17 days ago	about 18 hours ago	READ

+ Create new token

5. Under Token type, select Read and enter a Token name.

Hugging Face Search models, datasets, users...

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Create new Access Token

Token type

Fine-grained **Read** Write

⚠️ This cannot be changed after token creation.

Token name

esdq

This token has read-only access to all your and your orgs resources and can make calls to inference API on your behalf. It can also be used to open pull requests and comment on discussions.

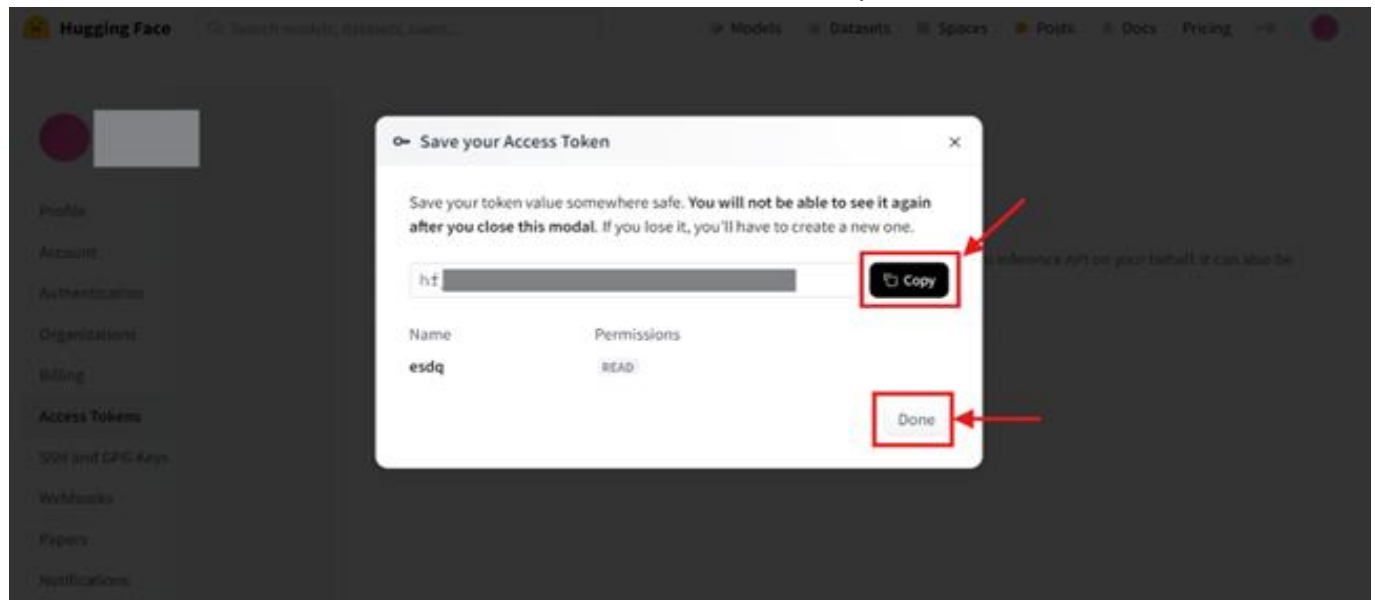
Create token

6. Select Create token.

7. Copy and save your access token in a secure location for future use, and then select Done to exit.

8. Export the Hugging Face token copied in your terminal. Ensure a similar terminal is used to run the application.

```
export HF_TOKEN=<your-huggingface-token>
```



Note Remember to copy, export, and store the generated access token so that it can be retrieved in the future.

Enable Relevant Repository Access on Hugging Face

Follow these steps to enable the [Llama-3.1-8B-Instruct](#) repository in Hugging Face.

Step 1: Browse Hugging Face Repository

1. Go to [Hugging Face](#) and sign in to your account.
2. Go to the [Llama-3.1-8B-Instruct](#) repository and select Expand to review and access.
3. Review the license agreement, fill in the necessary details, accept the license terms, and then select Submit.

By agreeing you accept to share your contact information (email and username) with the repository authors:

First Name

Last Name

Date of birth

Country

Affiliation

Your country and region (based on approximate Internet address) will be shared with the model owner.

☒ By clicking Submit below I accept the terms of the license and acknowledge that the information I provide will be collected stored processed and shared in accordance with the Meta Privacy Policy

Submit

4. After submission, validate whether the submission was successful.

Step 3: Run the Intel AI Edge Systems

After you receive the Llama-3.1-8B-Instruct repository approval email, run the Intel AI Edge Systems application by following the Get Started Guide.

Alternative Hugging Face Mirror Support

If the default [Hugging Face server](#) is not accessible, you may configure an alternative mirror by setting the HF_ENDPOINT environment variable as HF_ENDPOINT=https://hf-mirror.com.

Additionally, ensure that both the Docker client and Docker daemon environment configurations are updated to allow access to the mirror.

1. Docker daemon environment setup:

- Configure the Docker daemon environment as follows:

```
vi /etc/systemd/system/docker.service.d/daemon-env.conf
```

- Edit HF_ENDPOINT target as the section below:

```
[Service]
Environment="HF_ENDPOINT=https://hf-mirror.com"
```

- Reload the systemd daemon to apply the changes and restart docker by running the following commands:

```
sudo systemctl daemon-reload
sudo systemctl restart docker
```

2. Docker client configuration:

- If HF_ENDPOINT is not defined, the library will default to Hugging Face server.
- Before running the tool, set the HF_ENDPOINT=https://hf-mirror.com environment variable in /etc/environment or use the following command in your terminal session.

This ensures that the library will use the specified mirror for accessing Hugging Face resources.

Accessing Gated Repositories

Certain repository in [Hugging Face server](#) requires both login and permission. For security reason, [HF-mirror](#) does not support direct login.

- You need to log in to the official [Hugging Face website](#) and request permission there. Additionally, you must obtain your [Hugging Face Access Token](#) from the default Hugging Face website. Once you have the Access Token, you can proceed with downloading using Intel® ESQ CLI