NVIDIA TensorRT

Installation Guide | NVIDIA Docs

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Chapter 1. Overview

The core of NVIDIA® TensorRT™ is a C++ library that facilitates high-performance inference on NVIDIA graphics processing units (GPUs). TensorRT takes a trained network consisting of a network definition and a set of trained parameters and produces a highly optimized runtime engine that performs inference for that network.

TensorRT provides APIs via C++ and Python that help to express deep learning models via the Network Definition API or load a pre-defined model via the ONNX parser that allows TensorRT to optimize and run them on an NVIDIA GPU. TensorRT applies graph optimizations layer fusions, among other optimizations, while also finding the fastest implementation of that model leveraging a diverse collection of highly optimized kernels. TensorRT also supplies a runtime that you can use to execute this network on all of NVIDIA's GPUs from the NVIDIA Volta™ generation onwards.

TensorRT includes optional high-speed mixed-precision capabilities with the NVIDIA Volta, NVIDIA Turing™, NVIDIA Ampere architecture, NVIDIA Ada Lovelace architecture, and NVIDIA Hopper™ Architectures.

Chapter 2. Getting Started

Ensure you are familiar with the following installation requirements and notes.

- If you use the TensorRT Python API and CUDA-Python but haven't installed it on your system, refer to the NVIDIA CUDA-Python Installation Guide.
- Ensure you are familiar with the NVIDIA TensorRT Release Notes.
- Verify that you have the NVIDIA CUDA™ Toolkit installed. If CUDA has not been installed, review the NVIDIA CUDA Installation Guide for instructions on installing the CUDA Toolkit. The following versions are supported:
  - 12.5 update 1
  - 12.4 update 1
  - 12.3 update 2
  - 12.2 update 2
  - 12.1 update 1
  - 12.0 update 1
  - 11.8
  - 11.7 update 1
  - 11.6 update 2
  - 11.5 update 2
  - 11.4 update 4
  - 11.3 update 1
  - 11.2 update 2
  - 11.1 update 1
  - 11.0 update 3
- cuDNN is now an optional dependency for TensorRT and is only used to speed up several layers. If you require cuDNN, verify that you have it installed. Review the NVIDIA cuDNN Installation Guide for more information. TensorRT 10.3.0 supports cuDNN 8.9.7. cuDNN is not used by the lean or dispatch runtimes.
- cuBLAS is now an optional dependency for TensorRT and is only used to speed up several layers. If you require cuBLAS, verify that you have it installed. Review the NVIDIA cuBLAS website for more information.

- Some Python samples require TensorFlow 2.13.1, such as `efficientdet` and `efficientnet`.
- The PyTorch examples have been tested with PyTorch >= 2.0 but may work with older versions.
- The ONNX-TensorRT parser has been tested with ONNX 1.16.0 and supports opset 20.
- The installation instructions below assume you want both the C++ and Python APIs. However, you may not want to install the Python functionality in some environments and use cases. If so, don't install the Debian or RPM packages labeled Python or the `whole` files. None of the C++ API functionality depends on Python.
- We provide the possibility to install TensorRT in three different modes:
  - A full installation of TensorRT, including TensorRT plan file builder functionality. This mode is the same as the runtime provided before TensorRT 8.6.0.
  - A lean runtime installation is significantly smaller than the full installation. It allows you to load and run engines built with a version-compatible builder flag. However, this installation does not provide the functionality to build a TensorRT plan file.
  - A dispatch runtime installation. This installation allows for deployments with minimum memory consumption. It allows you to load and run engines built with a version compatible with the builder flag and includes the lean runtime. However, it does not provide the functionality to build a TensorRT plan file.

Chapter 3. Installing TensorRT

When installing TensorRT, you can choose between the following installation options: Debian or RPM packages, a Python wheel file, a tar file, or a zip file.

The Debian and RPM installations automatically install any dependencies; however, it:

- requires `sudo` or root privileges to install
- provides no flexibility as to which location TensorRT is installed into
- requires that the CUDA Toolkit has also been installed using Debian or RPM packages.
- does not allow more than one minor version of TensorRT to be installed at the same time

The tar file provides more flexibility, such as installing multiple versions of TensorRT simultaneously. However, you must install the necessary dependencies and manage `LD_LIBRARY_PATH` yourself. For more information, refer to Tar File Installation.

TensorRT versions: TensorRT is a product made up of separately versioned components. The product version conveys important information about the significance of new features, while the library version conveys information about the compatibility or incompatibility of the API.

Table 1. Versioning of TensorRT components

Product or Component	Previously Released Version	Current Version	Version Description
TensorRT product	10.2.0	10.3.0	+1.0.0 when significant new capabilities are added. +0.1.0 when capabilities have been improved.
`nvinfer` libraries, headers, samples, and documentation.	10.2.0	10.3.0	+1.0.0 when the API or ABI

Product or Component		Previously Released Version	Current Version	Version Description
				changes in a non-compatible way. +0.1.0 when the API or ABI changes are backward compatible
`nvinfer-lean` lean runtime library		10.2.0	10.3.0	+1.0.0 when the API or ABI changes in a non-compatible way. +0.1.0 when the API or ABI changes are backward compatible.
`nvinfer-dispatch` dispatch runtime library		10.2.0	10.3.0	+1.0.0 when the API or ABI changes in a non-compatible way. +0.1.0 when the API or ABI changes are backward compatible.
`libnvinfer` Python packages	▶ `python3-libnvinfer` ▶ `python3-libnvinfer-dev` ▶ Debian and RPM packages	10.2.0	10.3.0	+1.0.0 when the API or ABI changes in a non-compatible way. +0.1.0 when the API or ABI changes are backward compatible.
	`tensorrt-*.whl` file for standard TensorRT runtime	10.2.0	10.3.0	

Product or Component		Previously Released Version	Current Version	Version Description
	`tensorrt_lean-*.whl` file for lean TensorRT runtime	10.2.0	10.3.0	
	`tensorrt_dispatch-*.whl` file for dispatch TensorRT runtime	10.2.0	10.3.0	

3.1. Python Package Index Installation

This section contains instructions for installing TensorRT from the Python Package Index.

When installing TensorRT from the Python Package Index, you're not required to install TensorRT from a `.tar`, `.deb`, `.rpm`, or `.zip` package. All required libraries are included in the Python package. However, the header files, which may be needed to access TensorRT C++ APIs or compile plugins written in C++, are not included. Additionally, if you already have the TensorRT C++ library installed, using the Python package index version will install a redundant copy of this library, which may not be desirable. Refer to Tar File Installation for information on manually installing TensorRT wheels that do not bundle the C++ libraries. You can stop after this section if you only need Python support.

The `tensorrt` Python wheel files only currently support Python versions 3.8 to 3.12 and will not work with other versions. Only the Linux and Windows operating systems and the x86_64 CPU architecture are presently supported. These Python wheel files are expected to work on RHEL 8 or newer, Ubuntu 20.04 or newer, and Windows 10 or newer.

Note: If you do not have root access, you are running outside a Python virtual environment, or for any other reason you would prefer a user installation, then append `--user` to any of the `pip` commands provided.

1. Ensure the `pip` Python module is up-to-date and the `wheel` Python module is installed before proceeding, or you may encounter issues during the TensorRT Python installation.

```
python3 -m pip install --upgrade pip
python3 -m pip install wheel
```

2. Install the TensorRT Python wheel.

Note: If upgrading to a newer version of TensorRT, you may need to run the command `pip cache remove "tensorrt*"` to ensure the `tensorrt` meta packages are rebuilt and the latest dependent packages are installed.

```
python3 -m pip install --upgrade tensorrt
```

The above `pip` command will pull in all the required CUDA libraries in Python wheel format from PyPI because they are dependencies of the TensorRT Python wheel. Also, it will upgrade `tensorrt` to the latest version if you have a previous version installed.

A TensorRT Python Package Index installation is split into multiple modules:

- TensorRT libraries (`tensorrt_libs`)
- Python bindings matching the Python version in use (`tensorrt_bindings`)
- Frontend source package, which pulls in the correct version of dependent TensorRT modules from pypi.nvidia.com (`tensorrt`)
- You can append `-cu11` or `-cu12` to any Python module if you require a different CUDA major version. When unspecified, the TensorRT Python meta-packages default to the CUDA 12.x variants, the latest CUDA version supported by TensorRT.

Optionally, install the TensorRT lean or dispatch runtime wheels, which are similarly split into multiple Python modules. If you only use TensorRT to run pre-built version compatible engines, you can install these wheels without the regular TensorRT wheel.

```
python3 -m pip install --upgrade tensorrt_lean
python3 -m pip install --upgrade tensorrt_dispatch
```

3. To verify that your installation is working, use the following Python commands:
   - Import the `tensorrt` Python module.
   - Confirm that the correct version of TensorRT has been installed.
   - Create a `Builder` object to verify that your CUDA installation is working.

```
python3
>>> import tensorrt
>>> print(tensorrt.__version__)
>>> assert tensorrt.Builder(tensorrt.Logger())
```

Use a similar procedure to verify that the lean and dispatch modules work as expected:

```
python3
>>> import tensorrt_lean as trt
>>> print(trt.__version__)
>>> assert trt.Runtime(trt.Logger())

python3
>>> import tensorrt_dispatch as trt
>>> print(trt.__version__)
>>> assert trt.Runtime(trt.Logger())
```

Suppose the final Python command fails with an error message similar to the error message below. In that case, you may not have the NVIDIA driver installed, or the NVIDIA driver may not be working properly. If you are running inside a container, try starting from one of the `nvidia/cuda:x.y-base-<os>` containers.

```
[TensorRT] ERROR: CUDA initialization failure with error 100. Please check your CUDA
 installation: ...
```

If the Python commands above worked, you should now be able to run any of the TensorRT Python samples to confirm further that your TensorRT installation is

working. For more information about TensorRT samples, refer to the NVIDIA TensorRT Sample Support Guide.

3.2. Downloading TensorRT

Ensure you are a member of the NVIDIA Developer Program. If not, follow the prompts to gain access.

1. Go to: https://developer.nvidia.com/tensorrt.
2. Click GET STARTED, then click Download Now.
3. Select the version of TensorRT that you are interested in.
4. Select the check-box to agree to the license terms.
5. Click the package you want to install. Your download begins.

3.2.1. Debian Installation

This section contains instructions for a developer installation. This installation method is for new users or users who want the complete developer installation, including samples and documentation for both the C++ and Python APIs.

For advanced users who are already familiar with TensorRT and want to get their application running quickly, are using an NVIDIA CUDA container, or want to set automation, follow the network repo installation instructions (refer to Using The NVIDIA CUDA Network Repo For Debian Installation).

Note: When installing Python packages using this method, you must manually install dependencies with `pip`.

Ensure that you have the following dependencies installed.

- CUDA
  - 12.5 update 1
  - 12.4 update 1
  - 12.3 update 2
  - 12.2 update 2
  - 12.1 update 1
  - 12.0 update 1
  - 11.8
  - 11.7 update 1
  - 11.6 update 2
  - 11.5 update 2
  - 11.4 update 4

- 11.3 update 1
- 11.2 update 2
- 11.1 update 1
- 11.0 update 3

- cuDNN 8.9.7 (Optional and not required for lean or dispatch runtime installations.)

1. Install CUDA according to the CUDA installation instructions.
2. Download the TensorRT local repo file that matches the Ubuntu version and CPU architecture that you are using.
3. Install TensorRT from the Debian local repo package. Replace `ubuntuxx04`, `10.x.x`, and `cuda-x.x` with your specific OS, TensorRT, and CUDA versions. For ARM SBSA and JetPack users, replace `amd64` with `arm64`. JetPack users also need to replace `nv-tensorrt-local-repo` with `nv-tensorrt-local-tegra-repo`.

```
os="ubuntuxx04"
tag="10.x.x-cuda-x.x"
sudo dpkg -i nv-tensorrt-local-repo-${os}-${tag}_1.0-1_amd64.deb
sudo cp /var/nv-tensorrt-local-repo-${os}-${tag}/*-keyring.gpg /usr/share/keyrings/
sudo apt-get update
```

For the full C++ and Python runtimes

```
sudo apt-get install tensorrt
```

For the lean runtime only, instead of `tensorrt`

```
sudo apt-get install libnvinfer-lean10
sudo apt-get install libnvinfer-vc-plugin10
```

For lean runtime Python package

```
sudo apt-get install python3-libnvinfer-lean
```

For the dispatch runtime only, instead of `tensorrt`

```
sudo apt-get install libnvinfer-dispatch10
sudo apt-get install libnvinfer-vc-plugin10
```

For dispatch runtime Python package

```
sudo apt-get install python3-libnvinfer-dispatch
```

For all TensorRT Python packages without samples

```
python3 -m pip install numpy
sudo apt-get install python3-libnvinfer-dev
```

The following additional packages will be installed:

```
python3-libnvinfer
python3-libnvinfer-lean
python3-libnvinfer-dispatch
```

If you want to install Python packages only for the lean or dispatch runtime, specify these individually rather than installing the `dev` package.

If you want to run samples that require `onnx-graphsurgeon` or use the Python module for your project

```
python3 -m pip install numpy onnx onnx-graphsurgeon
```

4. Verify the installation.

For the full TensorRT release

```
dpkg-query -W tensorrt
```

You should see something similar to the following:

```
tensorrt 10.3.0.x-1+cuda12.5
```

For the lean runtime or the dispatch runtime only

```
dpkg-query -W "*nvinfer*"
```

You should see all related `libnvinfer*` files you installed.

3.2.1.1. Using The NVIDIA CUDA Network Repo For Debian Installation

This installation method is for advanced users who are already familiar with TensorRT and want to get their application running quickly or to set up automation, such as when using containers. New users or users who want the complete installation, including samples and documentation, should follow the local repo installation instructions (refer to Debian Installation).

Note: If you are using a CUDA container, then the NVIDIA CUDA network repository will already be set up, and you can skip step 1.

1. Follow the CUDA Toolkit Download page instructions to install the CUDA network repository.
   a). Select the Linux operating system.
   b). Select the desired architecture.
   c). Select the Ubuntu distribution.
   d). Select the desired Ubuntu version.
   e). Select the "deb (network)" installer type.
   f). Enter the commands provided into your terminal.

   You can omit the final `apt-get install` command if you do not require the entire CUDA Toolkit. While installing TensorRT, `apt` downloads the required CUDA dependencies for you automatically.
2. Install the TensorRT package that fits your particular needs.

   For the lean runtime only

   ```
   sudo apt-get install libnvinfer-lean10
   ```

   For the lean runtime Python package

   ```
   sudo apt-get install python3-libnvinfer-lean
   ```

   For the dispatch runtime only

   ```
   sudo apt-get install libnvinfer-dispatch10
   ```

   For the dispatch runtime Python package

   ```
   sudo apt-get install python3-libnvinfer-dispatch
   ```

   For only running TensorRT C++ applications

   ```
   sudo apt-get install tensorrt-libs
   ```

   For also building TensorRT C++ applications

   ```
   sudo apt-get install tensorrt-dev
   ```

   For also building TensorRT C++ applications with lean only

   ```
   sudo apt-get install libnvinfer-lean-dev
   ```

   For also building TensorRT C++ applications with dispatch only

   ```
   sudo apt-get install libnvinfer-dispatch-dev
   ```

   For the standard runtime Python package

   ```
   python3 -m pip install numpy
   ```

```
sudo apt-get install python3-libnvinfer
```

If you require additional Python modules

If your application requires other Python modules, such as `onnx-graphsurgeon`, then use `pip` to install them. Refer to onnx-graphsurgeon · PyPI for additional information.

3. Ubuntu will install TensorRT for the latest CUDA version by default when using the CUDA network repository. The following commands will install `tensorrt` and related TensorRT packages for an older CUDA version and hold these packages at this version. Replace `10.x.x.x` with your version of TensorRT and `cudax.x` with your CUDA version for your installation.

```
version="10.x.x.x-1+cudax.x"
sudo apt-get install libnvinfer-bin=${version} libnvinfer-dev=${version} libnvinfer-
dispatch-dev=${version} libnvinfer-dispatch10=${version} libnvinfer-headers-dev=
${version} libnvinfer-headers-plugin-dev=${version} libnvinfer-lean-dev=${version}
 libnvinfer-lean10=${version} libnvinfer-plugin-dev=${version} libnvinfer-plugin10=
${version} libnvinfer-samples=${version} libnvinfer-vc-plugin-dev=${version} libnvinfer-
vc-plugin10=${version} libnvinfer10=${version} libnvonnxparsers-dev=${version}
 libnvonnxparsers10=${version} python3-libnvinfer-dev=${version} python3-libnvinfer-
dispatch=${version} python3-libnvinfer-lean=${version} python3-libnvinfer=${version}
 tensorrt-dev=${version} tensorrt-libs=${version} tensorrt=${version}

sudo apt-mark hold libnvinfer-bin libnvinfer-dev libnvinfer-dispatch-dev libnvinfer-
dispatch10 libnvinfer-headers-dev libnvinfer-headers-plugin-dev libnvinfer-lean-
dev libnvinfer-lean10 libnvinfer-plugin-dev libnvinfer-plugin10 libnvinfer-samples
 libnvinfer-vc-plugin-dev libnvinfer-vc-plugin10 libnvinfer10 libnvonnxparsers-dev
 libnvonnxparsers10 python3-libnvinfer-dev python3-libnvinfer-dispatch python3-
libnvinfer-lean python3-libnvinfer tensorrt-dev tensorrt-libs tensorrt
```

If you want to upgrade to the latest version of TensorRT or the newest version of CUDA, you can unhold the packages using the following command.

```
sudo apt-mark unhold libnvinfer-bin libnvinfer-dev libnvinfer-dispatch-dev libnvinfer-
dispatch10 libnvinfer-headers-dev libnvinfer-headers-plugin-dev libnvinfer-lean-
dev libnvinfer-lean10 libnvinfer-plugin-dev libnvinfer-plugin10 libnvinfer-samples
 libnvinfer-vc-plugin-dev libnvinfer-vc-plugin10 libnvinfer10 libnvonnxparsers-dev
 libnvonnxparsers10 python3-libnvinfer-dev python3-libnvinfer-dispatch python3-
libnvinfer-lean python3-libnvinfer tensorrt-dev tensorrt-libs tensorrt
```

3.2.2. RPM Installation

This section contains instructions for installing TensorRT from an RPM package. This installation method is for new users or users who want the complete installation, including samples and documentation for both the C++ and Python APIs.

For advanced users already familiar with TensorRT and want to get their application running quickly or to set up automation, follow the installation instructions for the network repo (refer to Using The NVIDIA CUDA Network Repo For RPM Installation).

Note:

- Before issuing the commands, you must replace `rhelx`, `10.x.x`, and `cuda-x.x` with your specific OS, TensorRT, and CUDA versions.
- When installing Python packages using this method, you must manually install dependencies with `pip`.

Ensure that you have the following dependencies installed.

- CUDA
  - 12.5 update 1
  - 12.4 update 1
  - 12.3 update 2
  - 12.2 update 2
  - 12.1 update 1
  - 12.0 update 1
  - 11.8
  - 11.7 update 1
  - 11.6 update 2
  - 11.5 update 2
  - 11.4 update 4
  - 11.3 update 1
  - 11.2 update 2
  - 11.1 update 1
  - 11.0 update 3
- cuDNN 8.9.7 (Optional and not required for lean or dispatch runtime-only installations.)

1. Install CUDA according to the CUDA installation instructions.
2. Download the TensorRT local repo file that matches the RHEL/CentOS version and CPU architecture you are using.
3. Install TensorRT from the RPM local repo package.

```
os="rhelx"
tag="10.x.x-cuda-x.x"
sudo rpm -Uvh nv-tensorrt-local-repo-${os}-${tag}-1.0-1.x86_64.rpm
sudo yum clean expire-cache
```

For the full C++ and Python runtimes

```
sudo yum install tensorrt
```

For the lean runtime only, instead of `tensorrt`

```
sudo yum install libnvinfer-lean10
sudo yum install libnvinfer-vc-plugin10
```

For the lean runtime Python package

```
sudo yum install python3-libnvinfer-lean
```

For the dispatch runtime only, instead of `tensorrt`

```
sudo yum install libnvinfer-dispatch10
sudo yum install libnvinfer-vc-plugin10
```

For the dispatch runtime Python package

```
sudo yum install python3-libnvinfer-dispatch
```

For installing all TensorRT Python packages without samples

```
python3 -m pip install numpy
sudo yum install python3-libnvinfer-devel
```

The following additional packages will be installed:

```
python3-libnvinfer
python3-libnvinfer-lean
```

```
python3-libnvinfer-dispatch
```

> Note: For Rocky Linux or RHEL 8.x users, be aware that the TensorRT Python bindings will only be installed for Python 3.8 due to package dependencies and for better Python support. If your default `Python3` is version 3.6, you may need to use `update-alternatives` to switch to Python version 3.8 by default, invoke Python using `python3.8`, or remove `python36` packages if they are no longer required.

If you want to run samples that require `onnx-graphsurgeon` or use the Python module for your project

```
python3 -m pip install numpy onnx onnx-graphsurgeon
```

4. Verify the installation.

   For the full TensorRT release

   ```
   rpm -q tensorrt
   ```

   You should see something similar to the following:

   ```
   tensorrt-10.3.0.x-1.cuda12.5.x86_64
   ```

   For the lean runtime or the dispatch runtime only

   ```
   rpm -qa | grep nvinfer
   ```

   You should see all related `libnvinfer*` files you installed.

3.2.2.1. Using The NVIDIA CUDA Network Repo For RPM Installation

This installation method is for advanced users already familiar with TensorRT and who want to get their application running quickly or set up automation. New users or users who want the complete installation, including samples and documentation, should follow the local repo installation instructions (refer to RPM Installation).

> Note: If you use a CUDA container, the CUDA network repository will already be set up, and you can skip step 1.

1. To install the CUDA network repository, follow the instructions at the CUDA Toolkit Download page for the latest CUDA version.
   a). Select the Linux operating system.
   b). Select the desired architecture.
   c). Select the CentOS, RHEL, or Rocky distribution.
   d). Select the desired CentOS, RHEL, or Rocky version.
   e). Select the "rpm (network)" installer type.
   f). Enter the commands provided into your terminal.

   You can omit the final `yum/dnf install` command if you do not require the entire CUDA toolkit. While installing TensorRT, `yum/dnf` automatically downloads the required CUDA dependencies.
2. Install the TensorRT package that fits your particular needs. When using the NVIDIA CUDA network repository, RHEL will, by default, install TensorRT for the latest CUDA version. If you need the libraries for other CUDA versions, refer to step 3.

For the lean runtime only

```
sudo yum install libnvinfer-lean10
```

For the lean runtime Python package

```
sudo yum install python3-libnvinfer-lean
```

For the dispatch runtime only

```
sudo yum install libnvinfer-dispatch10
```

For the dispatch runtime Python package

```
sudo yum install python3-libnvinfer-dispatch
```

For only running TensorRT C++ applications

```
sudo yum install tensorrt-libs
```

For also building TensorRT C++ applications

```
sudo yum install tensorrt-devel
```

For also building TensorRT C++ applications with lean only

```
sudo yum install libnvinfer-lean-devel
```

For also building TensorRT C++ applications with dispatch only

```
sudo yum install libnvinfer-dispatch-devel
```

For the standard runtime Python package

```
python3 -m pip install numpy
sudo yum install python3-libnvinfer
```

If you require additional Python modules

If your application requires other Python modules, such as `onnx-graphsurgeon`, then use `pip` to install them. Refer to onnx-graphsurgeon · PyPI for additional information.

3. The following commands install `tensorrt` and related TensorRT packages for an older CUDA version and hold these packages at this version. Replace `10.x.x.x` with your version of TensorRT and `cudax.x` with your CUDA version for your installation.

```
version="10.x.x.x-1.cudax.x"
sudo yum install libnvinfer-bin-${version} libnvinfer-devel-${version} libnvinfer-
dispatch-devel-${version} libnvinfer-dispatch10-${version} libnvinfer-headers-devel-
${version} libnvinfer-headers-plugin-devel-${version} libnvinfer-lean-devel-${version}
 libnvinfer-lean10-${version} libnvinfer-plugin-devel-${version} libnvinfer-plugin10-
${version} libnvinfer-samples-${version} libnvinfer-vc-plugin-devel-${version}
 libnvinfer-vc-plugin10-${version} libnvinfer10-${version} libnvonnxparsers-devel-
${version} libnvonnxparsers10-${version} python3-libnvinfer-${version} python3-
libnvinfer-devel-${version} python3-libnvinfer-dispatch-${version} python3-libnvinfer-
lean-${version} tensorrt-${version} tensorrt-devel-${version} tensorrt-libs-${version}

sudo yum install yum-plugin-versionlock
sudo yum versionlock libnvinfer-bin libnvinfer-devel libnvinfer-dispatch-devel
 libnvinfer-dispatch10 libnvinfer-headers-devel libnvinfer-headers-plugin-devel
 libnvinfer-lean-devel libnvinfer-lean10 libnvinfer-plugin-devel libnvinfer-plugin10
 libnvinfer-samples libnvinfer-vc-plugin-devel libnvinfer-vc-plugin10 libnvinfer10
 libnvonnxparsers-devel libnvonnxparsers10 python3-libnvinfer python3-libnvinfer-devel
 python3-libnvinfer-dispatch python3-libnvinfer-lean tensorrt tensorrt-devel tensorrt-
libs
```

If you want to upgrade to the latest version of TensorRT or CUDA, you can unhold the packages using the following command.

```
sudo yum versionlock delete libnvinfer-bin libnvinfer-devel libnvinfer-dispatch-
devel libnvinfer-dispatch10 libnvinfer-headers-devel libnvinfer-headers-plugin-devel
 libnvinfer-lean-devel libnvinfer-lean10 libnvinfer-plugin-devel libnvinfer-plugin10
 libnvinfer-samples libnvinfer-vc-plugin-devel libnvinfer-vc-plugin10 libnvinfer10
 libnvonnxparsers-devel libnvonnxparsers10 python3-libnvinfer python3-libnvinfer-devel
 python3-libnvinfer-dispatch python3-libnvinfer-lean tensorrt tensorrt-devel tensorrt-
libs
```

3.2.3. Tar File Installation

This section contains instructions for installing TensorRT from a tar file.

Ensure that you have the following dependencies installed.

- CUDA
  - 12.5 update 1
  - 12.4 update 1
  - 12.3 update 2
  - 12.2 update 2
  - 12.1 update 1
  - 12.0 update 1
  - 11.8
  - 11.7 update 1
  - 11.6 update 2
  - 11.5 update 2
  - 11.4 update 4
  - 11.3 update 1
  - 11.2 update 2
  - 11.1 update 1
  - 11.0 update 3
- cuDNN 8.9.7 (Optional)
- Python 3 (Optional)

1. Download the TensorRT tar file that matches the CPU architecture and CUDA version you are using.
2. Choose where you want to install TensorRT. This tar file will install everything into a subdirectory called `TensorRT-10.x.x.x`.
3. Unpack the tar file.

```
version="10.x.x.x"
arch=$(uname -m)
cuda="cuda-x.x"
tar -xzvf TensorRT-${version}.Linux.${arch}-gnu.${cuda}.tar.gz
```

Where:

- `9.x.x.x` is your TensorRT version
- `cuda-x.x` is CUDA version `11.8` or `12.5`

This directory will have sub-directories like `lib`, `include` `data`, etc.

```
ls TensorRT-${version}
bin  data  doc  include  lib  python  samples  targets
```

4. Add the absolute path to the TensorRT `lib` directory to the environment variable `LD_LIBRARY_PATH`:

```
export LD_LIBRARY_PATH=<TensorRT-${version}/lib>:$LD_LIBRARY_PATH
```

5. Install the Python TensorRT wheel file (replace `cp3x` with the desired Python version, for example, `cp310` for Python 3.10).

```
cd TensorRT-${version}/python

python3 -m pip install tensorrt-*-cp3x-none-linux_x86_64.whl
```

   Optionally, install the TensorRT lean and dispatch runtime wheel files:

```
python3 -m pip install tensorrt_lean-*-cp3x-none-linux_x86_64.whl
python3 -m pip install tensorrt_dispatch-*-cp3x-none-linux_x86_64.whl
```

6. Verify the installation:
   a). Ensure that the installed files are located in the correct directories. For example, run the `tree -d` command to check whether all supported installed files are in place in the `lib`, `include`, `data`, and so on directories.
   b). Build and run one of the shipped samples, `sampleOnnxMNIST`, in the installed directory. You should be able to compile and execute the sample without additional settings. For more information, refer to sampleOnnxMNIST.
   c). The Python samples are in the `samples/python` directory.

3.2.4. Zip File Installation

This section contains instructions for installing TensorRT from a zip package on Windows.

Ensure that you have the following dependencies installed.

- CUDA
  - 12.5 update 1
  - 12.4 update 1
  - 12.3 update 2
  - 12.2 update 2
  - 12.1 update 1
  - 12.0 update 1
  - 11.8
  - 11.7 update 1
  - 11.6 update 2
  - 11.5 update 2
  - 11.4 update 4
  - 11.3 update 1
  - 11.2 update 2
  - 11.1 update 1
  - 11.0 update 3

- cuDNN 8.9.7 (Optional)

1. Download the TensorRT zip file that matches the Windows version you are using.
2. Choose where you want to install TensorRT. The zip file will install everything into a subdirectory called `TensorRT-10.x.x.x`. This new subdirectory will be called `<installpath>` in the steps below.
3. Unzip the `TensorRT-10.x.x.x.Windows.win10.cuda-x.x.zip` file to the location that you chose.

   Where:

   - `10.x.x.x` is your TensorRT version
   - `cuda-x.x` is CUDA version `11.8` or `12.5`
4. Add the TensorRT library files to your system `PATH`. There are two ways to accomplish this task:

   a). Leave the DLL files where they were unzipped and add `<installpath>/lib` to your system `PATH`. You can add a new path to your system `PATH` using the steps below.

   i. Press the Windows key and search for "environment variables", which should present you with the option to Edit the system environment variables and click it.

   ii. Click Environment Variables... at the bottom of the window.

   iii. Under System variables, select Path and click Edit....

   iv. Click either New or Browse to add a new item that contains `<installpath>/lib`.

   v. Continue to click OK until all the newly opened windows are closed.

   b). Copy the DLL files from `<installpath>/lib` to your CUDA installation directory, for example, `C:\Program Files\NVIDIA GPU Computing Toolkit\CUDA\vX.Y\bin`, where `vX.Y` is your CUDA version. The CUDA installer should have already added the CUDA path to your system `PATH`.
5. Install one of the TensorRT Python wheel files from `<installpath>/python` (replace `cp3x` with the desired Python version, for example, `cp310` for Python 3.10):

   ```
   python.exe -m pip install tensorrt-*-cp3x-none-win_amd64.whl
   ```

   Optionally, install the TensorRT lean and dispatch runtime wheel files:

   ```
   python.exe -m pip install tensorrt_lean-*-cp3x-none-win_amd64.whl
   python.exe -m pip install tensorrt_dispatch-*-cp3x-none-win_amd64.whl
   ```
6. To verify that your installation is working, you should open a Visual Studio Solution file from one of the samples, such as sampleOnnxMNIST, and confirm that you can build and run the sample.

   If you want to use TensorRT in your project, ensure that the following is present in your Visual Studio Solution project properties:

   a). `<installpath>/lib` has been added to your `PATH` variable and is present under VC ++ Directories > Executable Directories.

   b). `<installpath>/include` is present under C/C++ > General > Additional Directories.

c). `nvinfer.lib` and any other `LIB` files your project requires are present under Linker > Input > Additional Dependencies.

Note: To build the included samples, you should have Visual Studio 2019 or later installed. The community edition is sufficient to build the TensorRT samples.

3.3. Additional Installation Methods

Aside from installing TensorRT from the product package, you can also install TensorRT from the following locations.

NVIDIA NIM
For developing AI-powered enterprise applications and deploying AI models in production. Refer to the NVIDIA NIM technical blog post for more information.

TensorRT container
The TensorRT container provides an easy method for deploying TensorRT with all necessary dependencies already packaged in the container. For information about installing TensorRT using a container, refer to the NVIDIA TensorRT Container Release Notes.

NVIDIA JetPack™
JetPack bundles all Jetson platform software, including TensorRT. Use it to flash your Jetson Developer Kit with the latest OS image, install NVIDIA SDKs, and jump-start your development environment. For information about installing TensorRT through JetPack, refer to the JetPack documentation.

For JetPack downloads, refer to the Develop: Jetpack.

DRIVE OS Linux Standard
For step-by-step instructions on installing TensorRT, refer to the NVIDIA DRIVE Platform Installation section with NVIDIA SDK Manager. The safety proxy runtime is not installed by default in the NVIDIA DRIVE OS Linux SDK. Refer to the DRIVE OS Installation Guide to install it on this platform.

3.3.1. Cross-Compile Installation

If you intend to cross-compile TensorRT for AArch64, start with the Using The NVIDIA CUDA Network Repo For Debian Installation section to set up the network repository and TensorRT for the host. Steps to prepare your machine for cross-compilation and instructions for cross-compiling the TensorRT samples can be found in Cross Compiling Samples For AArch64 Users.

Chapter 4. Upgrading TensorRT

Upgrading TensorRT to the latest version is only supported when the currently installed TensorRT version is equal to or newer than the last two public GA releases.

If you want to upgrade from an unsupported version, you should incrementally upgrade until you reach the latest version of TensorRT or uninstall and then reinstall the latest version. If you have an EA version of TensorRT installed, you should first upgrade to the corresponding GA version.

4.1. Linux And Windows Users

The following section provides step-by-step instructions for upgrading TensorRT for Linux and Windows users.

4.1.1. Upgrading From TensorRT 10.x.x To TensorRT 10.3.x

When upgrading from TensorRT 10.x.x to TensorRT 10.3.x, ensure you are familiar with the following.

Using a Debian file

- The Debian packages are designed to upgrade your development environment without removing any runtime components that other packages and programs might rely on. If you installed TensorRT 10.x.x using a Debian package and upgrade to TensorRT 10.3.x, your libraries (within minor versions), samples, and headers will all be updated to TensorRT 10.3.x content.
- When upgrading between TensorRT major versions, for example, from TensorRT 9.x to TensorRT 10.x, runtime packages from both major versions will coexist and not be replaced. Only the development packages (C++ headers, `.a` files, `.so` files without a version) will be replaced when upgrading to a new TensorRT major version.
- After downloading the new local repo, use `apt-get` to upgrade your system to the new version of TensorRT.

```
os="ubuntuxx04"
tag="10.x.x-cuda-x.x"
```

```
sudo dpkg -i nv-tensorrt-local-repo-${os}-${tag}_1.0-1_amd64.deb
sudo cp /var/nv-tensorrt-local-repo-${os}-${tag}/*-keyring.gpg /usr/share/keyrings

sudo apt-get update
sudo apt-get install tensorrt
```

- After you upgrade, ensure you have a directory `/usr/src/tensorrt`, and the corresponding version shown by the `dpkg-query -W tensorrt` command is `10.x.x.x`.

> Note: ONNX GraphSurgeon is no longer included in the TensorRT Debian packages. You can remove the previous installation using `apt-get purge onnx-graphsurgeon`.

- If installing a Debian package on a system where the previously installed version was from a tar file, note that the Debian package will not remove the previously installed files. Removing the older version before installing the new version would be best to avoid compiling against outdated libraries unless a side-by-side installation is desired.

Using an RPM file

- The RPM packages are designed to upgrade your development environment without removing any runtime components that other packages and programs might rely on if you installed TensorRT 10.x.x via an RPM package and want to upgrade to TensorRT 10.3.x, your libraries (within minor versions), samples, and headers will all be updated to TensorRT 10.3.x content.
- When upgrading between TensorRT major versions, for example, from TensorRT 9.x to TensorRT 10.x, runtime packages from both major versions will coexist and not be replaced. Only the development packages (C++ headers, `.a` files, `.so` files without a version) will be replaced when upgrading to a new TensorRT major version.
- After you have downloaded the new local repo, issue:

```
os="rhelx"
tag="10.x.x-cuda-x.x"
sudo rpm -Uvh nv-tensorrt-local-repo-${os}-${tag}-1.0-1.x86_64.rpm
sudo yum clean expire-cache
sudo yum install tensorrt
```

- After you upgrade, ensure you see the `/usr/src/tensorrt` directory, and the corresponding version shown by the `rpm -q tensorrt` command is `10.x.x.x`.

> Note: ONNX GraphSurgeon is no longer included in the TensorRT RPM packages. You can remove the previous installation using `yum erase onnx-graphsurgeon`.

Using a tar file

- If you upgrade using the tar file installation method, install TensorRT in a new location. Tar file installations can support multiple use cases, including having a full installation of TensorRT 10.x.x with headers and libraries side-by-side with a full installation of TensorRT 10.3.x. If the intention is to have the new version of

TensorRT replace the old version, then the old version should be removed once the new version is verified.

- For the new TensorRT tar file installation, update the environment variable `LD_LIBRARY_PATH` to the absolute path containing the TensorRT `lib` directory.
- If installing a tar file on a system where the previously installed version was from a Debian package, note that the tar file installation will not remove the previously installed packages. Unless a side-by-side installation is desired, removing the previously installed `libnvinfer10`, `libnvinfer-dev`, `libnvinfer-samples`, and other related packages would be best to avoid confusion.

Using a zip file

- If you upgrade using the zip file installation method, install TensorRT in a new location. Zip file installations can support multiple use cases, including having a full installation of TensorRT 10.x.x with headers and libraries side-by-side with a full installation of TensorRT 10.3.x. If the intention is to have the new version of TensorRT replace the old version, then the old version should be removed once the new version is verified.
- After unzipping the new version of TensorRT, you must either update the `PATH` environment variable to point to the new installation location or copy the DLL files to the location where you previously installed the TensorRT libraries. Refer to Zip File Installation for more information about setting the `PATH` environment variable.

Chapter 5. Uninstalling TensorRT

When installing TensorRT using the Python Package Index, you must explicitly remove the Python module dependencies to uninstall it completely. For a CUDA 12.x installation, remove all TensorRT Python modules using the following example command.

```
python3 -m pip uninstall tensorrt tensorrt-cu12 tensorrt-cu12-bindings tensorrt-cu12-libs
```

To uninstall TensorRT using the tar file, delete the untarred files and reset `LD_LIBRARY_PATH` to its original value.

To uninstall TensorRT using the zip file, delete the unzipped files and remove the newly added path from the `PATH` environment variable.

When installing the Python TensorRT wheel files using a tar or zip file, use the following commands to uninstall them.

```
sudo python3 -m pip uninstall tensorrt
sudo python3 -m pip uninstall tensorrt_lean
sudo python3 -m pip uninstall tensorrt_dispatch
```

To uninstall TensorRT using the Debian or RPM packages, uninstall `libnvinfer10`, which was also installed using these packages.

```
sudo apt-get purge "libnvinfer*"
sudo apt-get purge "nv-tensorrt-local-repo*"
```

or

```
sudo yum erase "libnvinfer*"
sudo yum erase "nv-tensorrt-local-repo*"
```

Chapter 6. Troubleshooting

Refer to your support engineer or post your questions on the NVIDIA Developer Forum for troubleshooting support.

Appendix A. Appendix

The following section provides our list of acknowledgements.

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getopt.c

$OpenBSD: getopt_long.c,v 1.23 2007/10/31 12:34:57 chl Exp $

$NetBSD: getopt_long.c,v 1.15 2002/01/31 22:43:40 tv Exp $

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RESNET-50 Caffe models

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Boost Beast

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