Build and Use Intel® Deep Learning Streamer on the Windows* OS

User Guide

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Contents

Figures

Tables

Revision History

Date	Revision	Description
May 2022	0.9	Initial release.

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1.0 Introduction

Intel® Deep Learning Streamer (Intel® DL Streamer) is a media streaming analytics framework that is based on the GStreamer* multimedia framework. Intel® DL Streamer is used to create complex media analytics pipelines. The Intel® DL Streamer's powerful and complex media analytics have new elements that can run inference operations using the Intel® Distribution of OpenVINO™ Toolkit Inference Engine backend across Intel® architecture - CPU, iGPU and Intel® Movidius™ VPU.

The Intel® DL Streamer facilitates media analytics through the following ways:

- Writes less code and gets better performance
- Quickly develops, optimizes, benchmarks, and deploys video and audio analytics pipelines in the Cloud and at the Edge
- Analyzes video and audio streams, creates actionable results, captures results, and sends them to the cloud
- Leverages the efficiency and computational power of Intel hardware platforms

For Linux* system, the Intel® DL Streamer is already integrated inside the Intel® Distribution of OpenVINO™ toolkit. Users can use the Intel® DL Streamer after installing the OpenVINO™ toolkit. The Intel® DL Streamer is not integrated inside the OpenVINO™ toolkit for Windows* OS. Users on the Windows* OS will need to build the Intel® DL Streamer separately.

This guide provides the step-by-step instructions on how to build and use the Intel® DL Streamer on the Windows* 10 system.

1.1 Terminology

Table 1. Terminology

Term	Description
Intel® DL Streamer	Intel® Deep Learning Streamer
OpenVINO™ Toolkit	Open Visual Inference & Neural Network Optimization Toolkit

1.2 Reference Documents

Log in to the Resource and Documentation Center (rdc.intel.com) to search for and download the document numbers listed in the following table. Contact your Intel field representative for access.

Note: Third-party links are provided as a reference only. Intel does not control or audit third-party benchmark data or the web sites referenced in this document. You should visit the referenced web site and confirm whether the referenced data are accurate.

Table 2. Reference Documents

Document	Document No./Location
Intel® DL Streamer Wiki	https://github.com/dlstreamer/dlstreamer/wiki

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2.0 Build Intel® Deep Learning Streamer on Windows* OS

To build the Intel® DL Streamer, you will need to install the dependency files first before setting up the environment to allow the make build system to find the dependencies.

You can follow the steps to finish the build.

2.1 System Setup

1) Windows 10* host system

   This guide was tested on Windows 10 version 21H2*.

2) Install Python 3* for Windows* OS: https://www.python.org/downloads/

   This guide was tested on Python3.9*.

3) Install CMake 3.14* or newer for Windows OS*: https://cmake.org/download/

   This guide was tested on CMake 3.14.2*.

4) Install Visual Studio 2019* from the official site with C++ build tools: https://visualstudio.microsoft.com/downloads/

   Visual Studio 2019* is required (previous versions such as Visual Studio 2017 will meet the minor compile error, but you will need to fix it manually).

5) Install GStreamer 1.16.2* runtime and development packages:

   https://gstreamer.freedesktop.org/data/pkg/windows/1.16.2/gstreamer-1.0-msvc-x86_64-1.16.2.msi

   https://gstreamer.freedesktop.org/data/pkg/windows/1.16.2/gstreamer-1.0-devel-msvc-x86_64-1.16.2.msi

   GStreamer will be installed to C:\gstreamer\

Note: Intel recommends you to select “complete” install during the GStreamer* setup. Please check the installation guide for each component

6) Install pkg-config dependencies.

   Download the following archives and extract them into the same folder: (e.g. `C:work\pkg-config`):

- https://download.gnome.org/binaries/win32/dependencies/pkg-config_0.26-1_win32.zip
- https://download.gnome.org/binaries/win32/dependencies/gettext-runtime_0.18.1.1-2_win32.zip
- https://ftp.acc.umu.se/pub/GNOME/binaries/win32/glib/2.28/glib_2.28.8-1_win32.zip

Add the path inside the bin folder into the PATH environment variable. In this guide, this will be done later before the Intel® DL Streamer build.

You can also set the PATH environment to the system settings.

7) Install Intel® Distribution of OpenVINO™ Toolkit 2021.4

The Intel® DL Streamer depends on the OpenVINO™ toolkit as inference backend.

Please register to download the latest version of OpenVINO™ toolkit for Windows* OS.

Please download OpenVINO™ toolkit version2021.4 that was tested in this guide.

For the installation process, Intel recommends you to follow the steps in the OpenVINO™ Toolkit Installation Guide.

Please install the OpenVINO™ toolkit dependencies by following the steps in the OpenVINO™ toolkit installation guide.

Make sure to install OpenVINO™ model_optimizer and model_downloader prerequisites. These tools will be used to download and convert the models needed.

```
@REM Install Model Optimizer prerequisites
cd C:\Program Files
(x86)\Intel\openvino_2021\deployment_tools\model_optimizer
\install_prerequisites
.\install_prerequisites.bat

@REM Install Open Model Zoo downloader requirements
pip3 install -r C:\Program Files
(x86)\Intel\openvino_2021\deployment_tools\open_model_zoo\
tools\downloader\requirements.in
```

2.2 Build Intel® Deep Learning Streamer Source

2.2.1 Clone the Intel® Deep Learning Streamer source

Clone the Intel® DL Streamer source repository into the working folder and check out the branch.

```
mkdir C:\work
cd C:\work
git clone -b preview/support-for-windows
https://github.com/openvinotoolkit/dlstreamer_gst.git
dlstreamer_gst
REM checkout the validated tag
git checkout 5aa67f0
```

Note: This guide uses "C:\work" as the working directory as an example. You can replace it with another directory if needed.

2.2.2 Set up the Build Environment

The environment settings only affect the current open command console. If you open a new console, you will need to set the environment variable again.

```
set PATH=%PATH%;C:\work\pkg-config\bin
set PATH=%PATH%;C:\gstreamer\1.0\x86_64\bin
set PKG_CONFIG_PATH=C:\gstreamer\1.0\x86_64\lib\pkgconfig
```

2.2.3 Build the Intel® Deep Learning Streamer

Create a build directory and generate the Visual studio solution and projects before building it.

```
cd C:\work\dlstreamer_gst\build
mkdir build
cd build

cmake -G "Visual Studio 16 2019" -A x64" ..

@REM build
cmake --build . --config Release
```

The Intel® DL Streamer is now ready to use. For release version, the built files are under:

C:\work\dlstreamer\dlstreamer_gst\build\intel64\Release\bin\Release

Note: The Intel® DL Streamer needs to be built as a 64-bit since it depends on the OpenVINO™ toolkit, which supports a 64-bit build.

2.2.4 Install Built Files (Optional)

You can install the built files to the GStreamer* library path for GStreamer to locate the files.

You can also use the built files in the Release folder by setting the GST_PLUGIN_PATH and pointing it to the Release folder's location.

In this guide, the installation of the Intel® DL Streamer library includes the files to the GStreamer* default installation path. However, you can install the built files in another location.

Specify the CMAKE_INSTALL_PREFIX variable to tell cmake the install location. Then, make the "INSTALL" target to start installing.

If you did not set the installation location for the steps mentioned in Section 2.3.3, cmake will use the default "Program files" as the installation path.

Hence, re-generate the Microsoft Visual Studio* projects with the specified installation location. Then, build then install it.

For example:

```
cmake -DCMAKE_INSTALL_PREFIX=C:\gstreamer\1.0\x86_64 "Visual
Studio 16 2019" -A x64" ..

cmake --build . --config Release

cmake --build . --target INSTALL –config Release
```

The Intel® DL Streamer is now installed to the default GStreamer* library directory: C:\gstreamer\1.0\x86_64\lib and included files are also installed in: C:\gstreamer\1.0\x86_64\include

3.0 Run Intel® Deep Learning Streamer on Windows* OS

Since the Intel® DL Streamer is an extension of GStreamer*, runing the Intel® DL Streamer on the Windows* OS is similar as running the GStreamer* applications. The Intel® DL Streamer added more elements with the “gva” prefix specifically for complex media analytics pipelines.

Depending on the Intel® DL Streamer libraries locations, you will need to set the path environment in order for GStreamer to find the elements. If the Intel® DL Streamer is already installed in the GStreamer installation directory, there are no more additional steps.

3.1 Run Intel® Deep Learning Streamer

3.1.1 Set Environment and Download Models

After Intel® DL Streamer is built, you can run a sample to check if it works.

You can find the samples in folder C:\work\dlstreamer_gst\win_samples. Before using the samples, use this script to download the models required for samples: download_models.bat (located in win_samples folder)

```
@REM set MODELS_PATH
set MODELS_PATH=C:\work\modles

@REM set OpenVINO environment again if you closed previous
build console
C:\Program Files (x86)\Intel\openvino_2021\bin\setupvars.bat

@REM set Gstreamer PATH
set PATH=%PATH%;C:\gstreamer\1.0\x86_64\bin

@REM set DL Streamer library PATH
C:\work\dlstreamer_gst\win_scripts\setup_env.bat

@REM download the models now:
cd C:\work\dlstreamer_gst\win_samples
.\download_models.bat
```

Note: The download_models.bat script needs a MODELS_PATH environment variable to save the downloaded models. The models need to be downloaded only once.

3.1.2 Run samples

1) Run the command line sample:

   Command line sample is started by launching the gst-launch-1.0 console app. This is a tool that builds and runs basic GStreamer* pipelines.

```
@REM run the command line sample from script file
cd
C:\work\dlstreamer_gst\win_samples\gst_launch\face_detection_
and_classification
.\ face_detection_and_classification.bat
```

Note: The video path in the bat file is an online video from Github*. If you have connection issues, please download it manually into your local directory or select a local video.

2) Run cpp sample:

   The cpp sample source files are under:

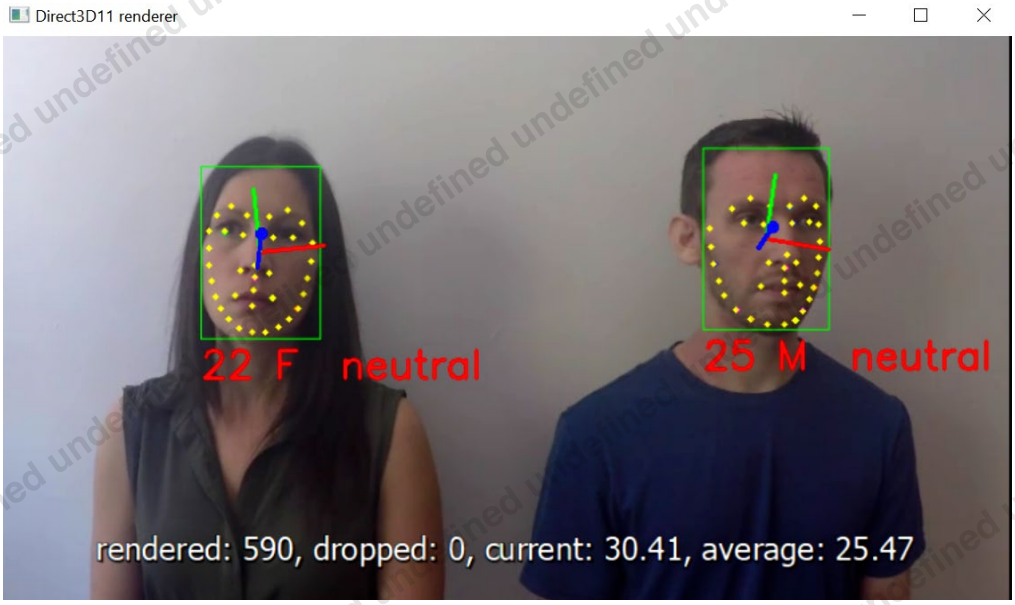
   C:\work\dlstreamer_gst\win_samples\cpp\draw_face_attributes

   It was already built during the Intel® DL Streamer build step.

```
@REM run the cpp command
cd C:\work\dlstreamer_gst\build\intel64\Release\bin\Release

draw_face_attributes.exe -i head-pose-face-detection-female-
and-male.mp4
```

Figure 1. Run Sample Result



3.2 Use Intel® Deep Learning Streamer Library in New Projects

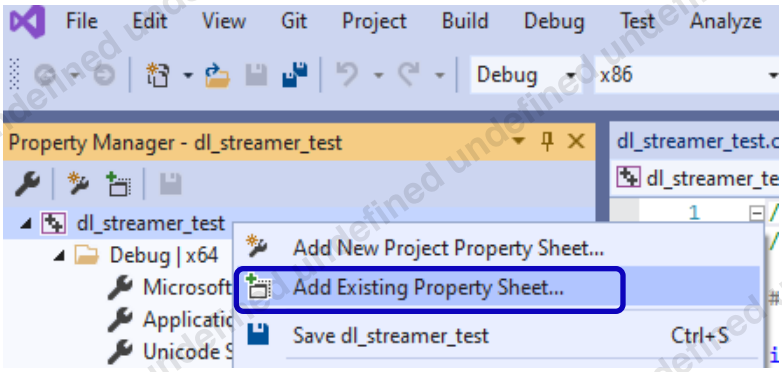
If you want to use the Intel® DL Streamer in your own (cpp) projects, you will need the reference samples to write the code for adding the required header files and libraries.

You will need to select the 64-bit platform.

GStreamer* has provided a “Property Sheet” to include the dependencies easily. In Visual Studio 2019, the property manager can be found in View>Property Manager.

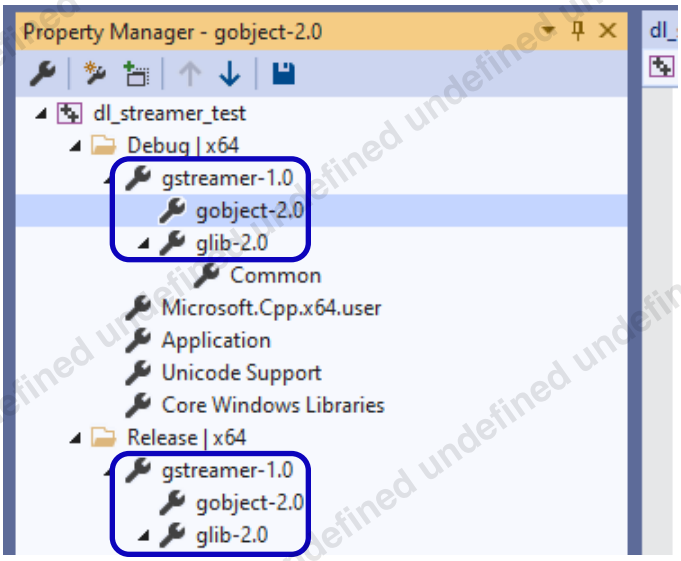
Right click on project name, select “Add Existing ...,” then load the following props: “STREAMER_ROOT_X86%\share\vs\2010\libs and load gstreamer-1.0.props”.

Figure 2. Snapshot for Adding Property Sheet



After this is done, the GSteramer* dependencies will be included in your project.

Figure 3. Property Sheet for GStreamer* Libraries



The property sheet description above also works for Intel® DL Streamer.

This property sheet contains the directories where the headers and libraries are located. It also includes the necessary options for the compiler and linker, so you do not need to change anything else in your project.

Note: If you need to use OpenCV libraries, you will need to add them manually as they are not included in the property sheet above.

4.0 Conclusion

With this guide, users will be able to build the Intel® DL Streamer, run Intel® DL Streamer samples, and use Intel® DL Streamer in new created projects on Windows 10* OS.

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