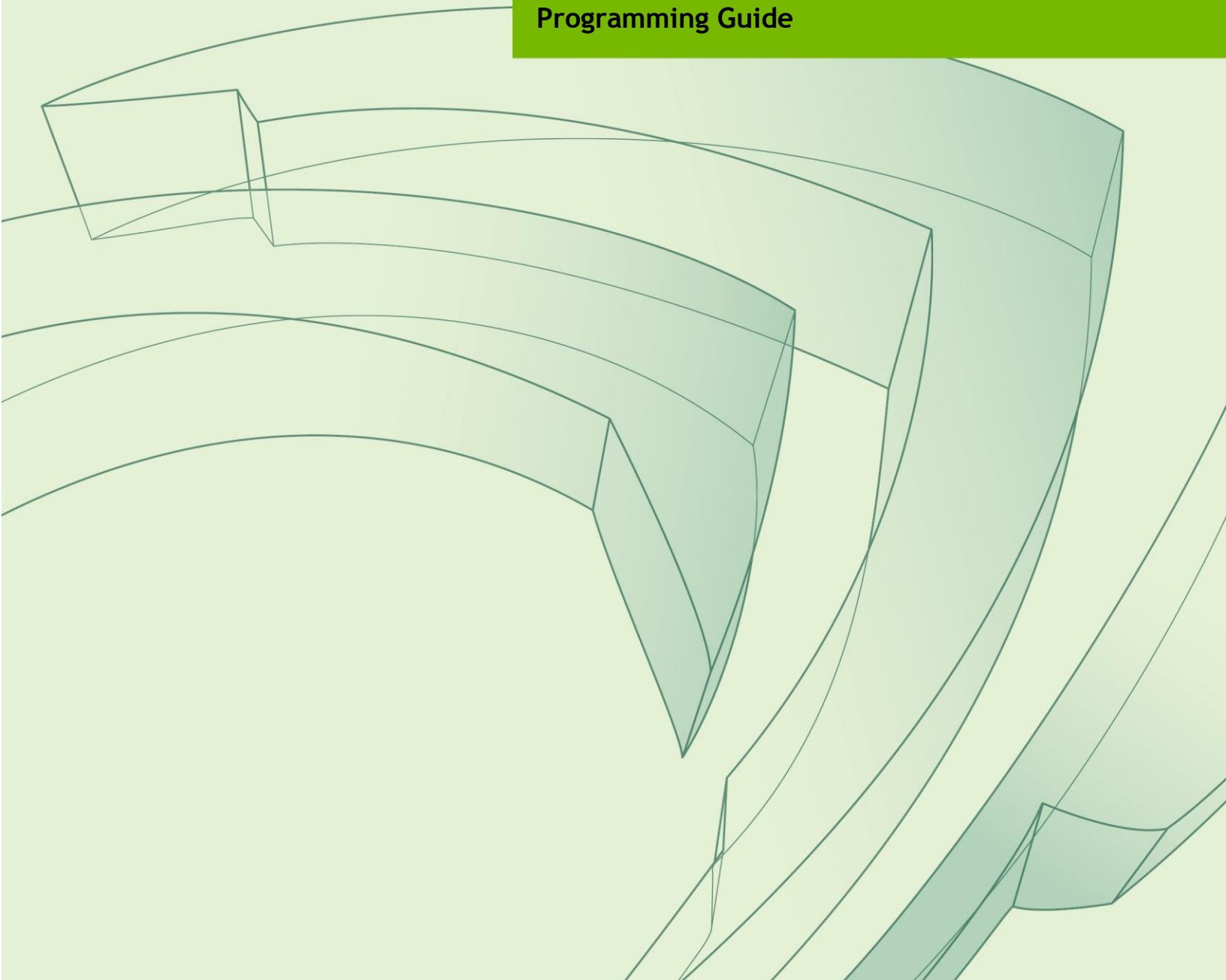
NVENC SDK 5.0 SAMPLES

NVENC_VideoEncoder_API_PG-06155-001_v05 | November 2014

Programming Guide



REVISION HISTORY

Revision	Date	Author	Description
1.0	Nov 14, 2014	YG	Initial release.

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NVENC 5.0 SAMPLES

INTRODUCTION

NVENC SDK 5.0 contains the following samples.

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The NvEncoderCudaInterop sample demonstrates the usage of encoding with CUDA surfaces

NvEncoderD3DInterop

The NvEncoderD3DInterop sample demonstrates the usage of encoding with DX surfaces

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The NvEncoderLowLatency sample demonstrates the usage of low latency features such as Intra Refresh and Reference Picture Invalidations

NvEncoderPerf

The NvEncoderPerf sample demonstrates the maximum performance that may be achieved by NvEncoder

NvTranscoder

The NvTranscoder sample demonstrates the transcoding capabilites of NVENC.

1. BUILDING SAMPLES

Windows

The Windows samples are built using the Visual Studio IDE. Solution files (.sln) are provided for Visual Studio 2013.

Complete samples solution files exist at:

```
SDK5.0\Samples\
```

Each individual sample has its own set of solution files at:

```
SDK5.0\Samples\<sample_dir>\
```

To build/examine all the samples at once, the complete solution files should be used. To build/examine a single sample, the individual sample solution files should be used.

Linux

The Linux samples are built using makefiles. To use the makefiles, change the current directory to the sample directory you wish to build, and run make:

```
$ cd <sample_dir>
$ make
```

2. SAMPLES REFERENCE

2.1 NvEncoder

The NvEncoder application demonstrates the code for doing a basic encoding using NVENC. It supports both H.264 and HEVC encoding with different presets. The application allows to configure bitrate, frame rate, number of B frames and allows the user to select from the given Rate Control Modes.

The following are the options that may be specified for NvEncoder Application.

-i <string> : Specifies the input YUV File that has to be encoded

-o <string> : Specifies the output bitstream file

-size <integer integer> : Specifies the input resolution width and height

-codec <integer>: Specifies the codec (0) – H264 and (1) - HEVC

-preset <string> : hq – High Quality Preset

hp – High Performance Preset

lowLatencyHP – Low Latency High Performance Preset

lowLatencyHQ – Low Latency High Quality Preset

-startf <integer> : Specifies the starting frame Index for encoding. Default value is zero

-endf < integer> : Specifies the end frame Index for encoding. Default value is zero

-fps <integer> : Specifies the encoding frame rate

-gopLength <integer> : Specifies the GOP (Group of Pictures) Length

-numB <integer> : Specifies the number of B frames

-bitrate <integer> : Specifies the encoding average bitrate

-vbvMaxBitrate <integer> : Specifies the VBV Maximum Bitrate

-vbvSize <integer> : Specifies the Encoding VBV/HRD Buffer Size

-rcmode <integer> : Specifies the Rate Control Mode.

0 : Constant QP

1 : Single Pass VBR

2 : Single Pass CBR

4 : Single Pass VBR with Minimum QP

8 : Two Pass Frame Quality

16 : Two Pass Frame Size Cap

32 : Two Pass VBR

-qp <integer> : Specifies the qp value for Constant QP Rate Control Mode

-devicetype <integer> : 0 – DX9 Device Type

1 – DX10 Device Type

2 – DX11 Device Type

3 – CUDA Device Type

-help : Prints Help Information

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2.2 NvEncoderCudaInterop

The NvEncoderCudaInterop application demonstrates the interoperability of encoder with CUDA surfaces.

The following are the options that may be specified for NvEncoderCudaInterop Application.

-i <string> : Specifies the input YUV File that has to be encoded

-o <string> : Specifies the output bitstream file

-size <integer integer> : Specifies the input resolution width and height

-startf <integer> : Specifies the starting frame Index for encoding. Default value is zero

-endf < integer> : Specifies the end frame Index for encoding. Default value is zero

-codec <integer>: Specifies the codec (0) – H264 and (1) - HEVC

-preset <string> : hq – High Quality Preset

hp – High Performance Preset

lowLatencyHP – Low Latency High Performance Preset

lowLatencyHQ – Low Latency High Quality Preset

-fps <integer> : Specifies the encoding frame rate

-gopLength <integer> : Specifies the GOP (Group of Pictures) Length

-numB <integer> : Specifies the number of B frames

-bitrate <integer> : Specifies the encoding average bitrate

-vbvMaxBitrate <integer> : Specifies the VBV Maximum Bitrate

-vbvSize <integer> : Specifies the Encoding VBV/HRD Buffer Size

-rcmode <integer> : Specifies the Rate Control Mode.

0 : Constant QP

1 : Single Pass VBR

2 : Single Pass CBR

4 : Single Pass VBR with Minimum QP

8 : Two Pass Frame Quality

16 : Two Pass Frame Size Cap

32 : Two Pass VBR

-qp <integer> : Specifies the qp value for Constant QP Rate Control Mode

-deviceID <integer> : Specifies the GPU Device on which encoding will take place

-help : Prints Help Information

2.3 NvEncoderD3DInterop

The NvEncoderD3DInterop application shows the interoperability with DX Surfaces. This application takes a directory of BMP files as an input and generates the output encoded file.

The following are the options that may be specified for NvEncoderD3DInterop Application.

-bmpfilePath <string> : Specifies the input RGB BMP file path

-o <string> : Specifies the output bitstream file

-size <integer integer> : Specifies the input resolution width and height

-codec <integer>: Specifies the codec (0) – H264 and (1) - HEVC

-preset <string> : hq – High Quality Preset

hp – High Performance Preset

lowLatencyHP – Low Latency High Performance Preset

lowLatencyHQ – Low Latency High Quality Preset

-fps <integer> : Specifies the encoding frame rate

-gopLength <integer> : Specifies the GOP (Group of Pictures) Length

-numB <integer> : Specifies the number of B frames

-bitrate <integer> : Specifies the encoding average bitrate

-vbvMaxBitrate <integer> : Specifies the VBV Maximum Bitrate

-vbvSize <integer> : Specifies the Encoding VBV/HRD Buffer Size

-rcmode <integer> : Specifies the Rate Control Mode.

0 : Constant QP

1 : Single Pass VBR

2 : Single Pass CBR

4 : Single Pass VBR with Minimum QP

8 : Two Pass Frame Quality

16 : Two Pass Frame Size Cap

32 : Two Pass VBR

-qp <integer> : Specifies the qp value for Constant QP Rate Control Mode

-help : Prints Help Information

2.4 NvEncoderLowLatency

The NVEncoderLowLatency Application demonstrates the encoding for low latency streaming. The application shows the usage of features such as Intra Refresh and Reference Picture Invalidation, Dynamic Resolution Change and Dynamic Bitrate Change that are extremely useful in error prone streaming environments.

The following are the options that may be specified for NvEncoderLowLatency Application.

-i <string> : Specifies the input YUV File that has to be encoded

-o <string> : Specifies the output bitstream file

-size <integer integer> : Specifies the input resolution width and height

-codec <integer>: Specifies the codec (0) – H264 and (1) - HEVC

-preset <string> : hq – High Quality Preset

hp – High Performance Preset

lowLatencyHP – Low Latency High Performance Preset

lowLatencyHQ – Low Latency High Quality Preset

-startf <integer> : Specifies the starting frame Index for encoding. Default value is zero

-endf < integer> : Specifies the end frame Index for encoding. Default value is zero

-fps <integer> : Specifies the encoding frame rate

-bitrate <integer> : Specifies the encoding average bitrate

-vbvSize <integer> : Specifies the Encoding VBV/HRD Buffer Size

-rcmode <integer> : Specifies the Rate Control Mode.

0 : Constant QP

1 : Single Pass VBR

2 : Single Pass CBR

4 : Single Pass VBR with Minimum QP

8 : Two Pass Frame Quality

16 : Two Pass Frame Size Cap

32 : Two Pass VBR

-encCmdFile <string> : Specifies the name of the encode command file. The commands can be given in the following format.

<encode command> <frame number> <param0> < param1>…<param15>

The following commands can be given in the encode command file:

0 : Dynamic Resolution Command <param0 = new Width> <param1 = new Height>

1 : Dynamic Bitrate Change <param0 = new bitrate> <param1 = new vbv size>

2 : Force IDR Frame

3 : Force Intra Refresh <param0 = intra refresh duration>

4. Invalidate Refrence Frame <param 0 = ref frame 0> <param1 = ref frame 1>..<param15 = ref frame 15>

-intraRefresh <boolean> : Specifies if Intra Refresh is used during Encoding

-intraRefreshPeriod <integer> : Specifies the period for cyclic Intra Refresh

-intraRefreshDuration <boolean> : Specifies the number of frames over which intra refresh takes place

-deviceID <integer> : Specifies the GPU Device on which encoding will take place

-**help** : Prints Help Information

2.5 NvEncoderPerf

The NvEncoderPerf Application demonstrates the maximum encoding performance that may be achieved using NVENC. The application buffers a large number of input frames

and execution may be constrained by the RAM available on a system. The MAX_FRAMES_TO_PRELOAD variable determines the number of frames that are buffered and may be reduced on systems with less free RAM available.

The following are the options that may be specified for NvEncoderPerf Application.

-i <string> : Specifies the input YUV File that has to be encoded

-o <string> : Specifies the output bitstream file

-size <integer integer> : Specifies the input resolution width and height

-codec <integer>: Specifies the codec (0) – H264 and (1) - HEVC

-preset <string> : hq – High Quality Preset

hp – High Performance Preset

lowLatencyHP – Low Latency High Performance Preset

lowLatencyHQ – Low Latency High Quality Preset

-startf <integer> : Specifies the starting frame Index for encoding. Default value is zero

-endf < integer> : Specifies the end frame Index for encoding. Default value is zero

-fps <integer> : Specifies the encoding frame rate

-gopLength <integer> : Specifies the GOP (Group of Pictures) Length

-numB <integer> : Specifies the number of B frames

-bitrate <integer> : Specifies the encoding average bitrate

-vbvMaxBitrate <integer> : Specifies the VBV Maximum Bitrate

-rcmode <integer> : Specifies the Rate Control Mode.

0 : Constant QP

1 : Single Pass VBR

2 : Single Pass CBR

4 : Single Pass VBR with Minimum QP

8 : Two Pass Frame Quality

16 : Two Pass Frame Size Cap

32 : Two Pass VBR

-qp <integer> : Specifies the qp value for Constant QP Rate Control Mode

-devicetype <integer> : 0 – DX9 Device Type

1 – DX10 Device Type

2 – DX11 Device Type

3 – CUDA Device Type

-help : Prints Help Information

2.6 NvTranscoder

The NvTranscoder Application demonstrates transcoding using NVENC. It supports inputs with H.264 encoding with YUV420P or NV12. YUV444 and lossless 4:4:4 are not supported. Videos encoded by MPEG1/MPEG2/MPEG4 are also not supported.

The following are the options that may be specified for NvTranscoder Application.

-i <string> : Specifies the input file that has to be transcoded

-o <string> : Specifies the output bitstream file

-size <integer integer> : Specifies the input resolution width and height for encoding. If not specified, it will use the width and height of the input file.

-codec <integer>: Specifies the codec (0) – H264 and (1) - HEVC

-preset <string> : hq – High Quality Preset

hp – High Performance Preset

lowLatencyHP – Low Latency High Performance Preset

lowLatencyHQ – Low Latency High Quality Preset

-fps <integer> : Specifies the encoding frame rate. If not specified, it will use the fps of the input file.

-gopLength <integer> : Specifies the GOP (Group of Pictures) Length

-numB <integer> : Specifies the number of B frames

-bitrate <integer> : Specifies the encoding average bitrate

-vbvMaxBitrate <integer> : Specifies the VBV Maximum Bitrate

-vbvSize <integer> : Specifies the Encoding VBV/HRD Buffer Size

-rcmode <integer> : Specifies the Rate Control Mode.

0 : Constant QP

1 : Single Pass VBR

2 : Single Pass CBR

4 : Single Pass VBR with Minimum QP

8 : Two Pass Frame Quality

16 : Two Pass Frame Size Cap

32 : Two Pass VBR

-qp <integer> : Specifies the qp value for Constant QP Rate Control Mode

-deviceID <integer> : Specifies the GPU Device on which encoding will take place

-help : Prints Help Information

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