



# LIBNVVM API

v7.0 | March 2015

## API Reference Manual



# TABLE OF CONTENTS

<b>Chapter 1. Modules.....</b>	<b>1</b>
1.1. Error Handling.....	1
nvvmResult.....	1
nvvmGetErrorString.....	2
1.2. General Information Query.....	2
nvvmVersion.....	2
1.3. Compilation.....	2
nvvmProgram.....	2
nvvmAddModuleToProgram.....	3
nvvmCompileProgram.....	3
nvvmCreateProgram.....	5
nvvmDestroyProgram.....	5
nvvmGetCompiledResult.....	6
nvvmGetCompiledResultSize.....	6
nvvmGetProgramLog.....	7
nvvmGetProgramLogSize.....	7
nvvmVerifyProgram.....	8

# Chapter 1.

## MODULES

Here is a list of all modules:

- ▶ Error Handling
- ▶ General Information Query
- ▶ Compilation

### 1.1. Error Handling

#### **enum nvvmResult**

NVVM API call result code.

##### **Values**

```
NVVM_SUCCESS = 0
NVVM_ERROR_OUT_OF_MEMORY = 1
NVVM_ERROR_PROGRAM_CREATION_FAILURE = 2
NVVM_ERROR_IR_VERSION_MISMATCH = 3
NVVM_ERROR_INVALID_INPUT = 4
NVVM_ERROR_INVALID_PROGRAM = 5
NVVM_ERROR_INVALID_IR = 6
NVVM_ERROR_INVALID_OPTION = 7
NVVM_ERROR_NO_MODULE_IN_PROGRAM = 8
NVVM_ERROR_COMPILATION = 9
```

## `const char *nvvmGetErrorString (nvvmResult result)`

Get the message string for the given nvvmResult code.

### Parameters

#### **result**

NVVM API result code.

### Returns

Message string for the given `nvvmResult` code.

## 1.2. General Information Query

## `nvvmResult nvvmVersion (int *major, int *minor)`

Get the NVVM version.

### Parameters

#### **major**

NVVM major version number.

#### **minor**

NVVM minor version number.

### Returns

- ▶ NVVM\_SUCCESS

## 1.3. Compilation

## `typedef _nvvmProgram *nvvmProgram`

NVVM Program.

An opaque handle for a program

## **nvvmResult nvvmAddModuleToProgram (nvvmProgram prog, const char \*buffer, size\_t size, const char \*name)**

Add a module level NVVM IR to a program.

### **Parameters**

#### **prog**

NVVM program.

#### **buffer**

NVVM IR module in the bitcode or text representation.

#### **size**

Size of the NVVM IR module.

#### **name**

Name of the NVVM IR module. If NULL, "<unnamed>" is used as the name.

### **Returns**

- ▶ NVVM\_SUCCESS
- ▶ NVVM\_ERROR\_OUT\_OF\_MEMORY
- ▶ NVVM\_ERROR\_INVALID\_INPUT
- ▶ NVVM\_ERROR\_INVALID\_PROGRAM

### **Description**

The buffer should contain an NVVM IR module either in the bitcode representation or in the text representation.

## **nvvmResult nvvmCompileProgram (nvvmProgram prog, int numOptions, const char \*\*options)**

Compile the NVVM program.

### **Parameters**

#### **prog**

NVVM program.

#### **numOptions**

Number of compiler options passed.

#### **options**

Compiler options in the form of C string array.

### **Returns**

- ▶ NVVM\_SUCCESS

- ▶ NVVM\_ERROR\_OUT\_OF\_MEMORY
- ▶ NVVM\_ERROR\_IR\_VERSION\_MISMATCH
- ▶ NVVM\_ERROR\_INVALID\_PROGRAM
- ▶ NVVM\_ERROR\_INVALID\_OPTION
- ▶ NVVM\_ERROR\_NO\_MODULE\_IN\_PROGRAM
- ▶ NVVM\_ERROR\_COMPILATION

## Description

The NVVM IR modules in the program will be linked at the IR level. The linked IR program is compiled to PTX.

The target datalayout in the linked IR program is used to determine the address size (32bit vs 64bit).

The valid compiler options are:

- ▶ -g (enable generation of debugging information)
- ▶ -opt=
  - ▶ 0 (disable optimizations)
  - ▶ 3 (default, enable optimizations)
- ▶ -arch=
  - ▶ compute\_20 (default)
  - ▶ compute\_30
  - ▶ compute\_35
- ▶ -ftz=
  - ▶ 0 (default, preserve denormal values, when performing single-precision floating-point operations)
  - ▶ 1 (flush denormal values to zero, when performing single-precision floating-point operations)
- ▶ -prec-sqrt=
  - ▶ 0 (use a faster approximation for single-precision floating-point square root)
  - ▶ 1 (default, use IEEE round-to-nearest mode for single-precision floating-point square root)
- ▶ -prec-div=
  - ▶ 0 (use a faster approximation for single-precision floating-point division and reciprocals)
  - ▶ 1 (default, use IEEE round-to-nearest mode for single-precision floating-point division and reciprocals)
- ▶ -fma=
  - ▶ 0 (disable FMA contraction)

- ▶ 1 (default, enable FMA contraction)

## **nvvmResult nvvmCreateProgram (nvvmProgram \*prog)**

Create a program, and set the value of its handle to \*prog.

### **Parameters**

#### **prog**

NVVM program.

### **Returns**

- ▶ NVVM\_SUCCESS
- ▶ NVVM\_ERROR\_OUT\_OF\_MEMORY
- ▶ NVVM\_ERROR\_INVALID\_PROGRAM

### **Description**

#### **See also:**

[nvvmDestroyProgram\(\)](#)

## **nvvmResult nvvmDestroyProgram (nvvmProgram \*prog)**

Destroy a program.

### **Parameters**

#### **prog**

NVVM program.

### **Returns**

- ▶ NVVM\_SUCCESS
- ▶ NVVM\_ERROR\_INVALID\_PROGRAM

### **Description**

#### **See also:**

[nvvmCreateProgram\(\)](#)

## **nvvmResult nvvmGetCompiledResult (nvvmProgram prog, char \*buffer)**

Get the compiled result.

### **Parameters**

#### **prog**

NVVM program.

#### **buffer**

Compiled result.

### **Returns**

- ▶ NVVM\_SUCCESS
- ▶ NVVM\_ERROR\_INVALID\_PROGRAM

### **Description**

The result is stored in the memory pointed by 'buffer'.

## **nvvmResult nvvmGetCompiledResultSize (nvvmProgram prog, size\_t \*bufferSizeRet)**

Get the size of the compiled result.

### **Parameters**

#### **prog**

NVVM program.

#### **bufferSizeRet**

Size of the compiled result (including the trailing NULL).

### **Returns**

- ▶ NVVM\_SUCCESS
- ▶ NVVM\_ERROR\_INVALID\_PROGRAM



## **nvvmResult nvvmGetProgramLog (nvvmProgram prog, char \*buffer)**

Get the Compiler/Verifier Message.

### **Parameters**

#### **prog**

NVVM program program.

#### **buffer**

Compilation/Verification log.

### **Returns**

- ▶ NVVM\_SUCCESS
- ▶ NVVM\_ERROR\_INVALID\_PROGRAM

### **Description**

The NULL terminated message string is stored in the memory pointed by 'buffer' when the return value is NVVM\_SUCCESS.

## **nvvmResult nvvmGetProgramLogSize (nvvmProgram prog, size\_t \*bufferSizeRet)**

Get the Size of Compiler/Verifier Message.

### **Parameters**

#### **prog**

NVVM program.

#### **bufferSizeRet**

Size of the compilation/verification log (including the trailing NULL).

### **Returns**

- ▶ NVVM\_SUCCESS
- ▶ NVVM\_ERROR\_INVALID\_PROGRAM

### **Description**

The size of the message string (including the trailing NULL) is stored into 'buffer\_size\_ret' when the return value is NVVM\_SUCCESS.

## **`nvvmResult nvvmVerifyProgram (nvvmProgram prog, int numOptions, const char **options)`**

Verify the NVVM program.

### **Parameters**

#### **prog**

NVVM program.

#### **numOptions**

Number of compiler options passed.

#### **options**

Compiler options in the form of C string array.

### **Returns**

- ▶ `NVVM_SUCCESS`
- ▶ `NVVM_ERROR_OUT_OF_MEMORY`
- ▶ `NVVM_ERROR_IR_VERSION_MISMATCH`
- ▶ `NVVM_ERROR_INVALID_PROGRAM`
- ▶ `NVVM_ERROR_INVALID_IR`
- ▶ `NVVM_ERROR_INVALID_OPTION`
- ▶ `NVVM_ERROR_NO_MODULE_IN_PROGRAM`

### **Description**

The valid compiler options are:

NONE. The `numOptions` and `options` parameters are ignored, and are for future use.

## **Notice**

ALL NVIDIA DESIGN SPECIFICATIONS, REFERENCE BOARDS, FILES, DRAWINGS, DIAGNOSTICS, LISTS, AND OTHER DOCUMENTS (TOGETHER AND SEPARATELY, "MATERIALS") ARE BEING PROVIDED "AS IS." NVIDIA MAKES NO WARRANTIES, EXPRESSED, IMPLIED, STATUTORY, OR OTHERWISE WITH RESPECT TO THE MATERIALS, AND EXPRESSLY DISCLAIMS ALL IMPLIED WARRANTIES OF NONINFRINGEMENT, MERCHANTABILITY, AND FITNESS FOR A PARTICULAR PURPOSE.

Information furnished is believed to be accurate and reliable. However, NVIDIA Corporation assumes no responsibility for the consequences of use of such information or for any infringement of patents or other rights of third parties that may result from its use. No license is granted by implication of otherwise under any patent rights of NVIDIA Corporation. Specifications mentioned in this publication are subject to change without notice. This publication supersedes and replaces all other information previously supplied. NVIDIA Corporation products are not authorized as critical components in life support devices or systems without express written approval of NVIDIA Corporation.

## **Trademarks**

NVIDIA and the NVIDIA logo are trademarks or registered trademarks of NVIDIA Corporation in the U.S. and other countries. Other company and product names may be trademarks of the respective companies with which they are associated.

## **Copyright**

© 2007-2015 NVIDIA Corporation. All rights reserved.