# Table of Contents

## Chapter 1. Modules

1. **Error Handling.**
   - `nvvmResult` ......................................................... 1
   - `nvvmGetErrorString` ........................................... 2

2. **General Information Query.**
   - `nvvmIRVersion` .................................................. 2
   - `nvvmVersion` ....................................................... 2

3. **Compilation.**
   - `nvvmProgram` ..................................................... 3
   - `nvvmAddModuleToProgram` .................................... 3
   - `nvvmCompileProgram` .......................................... 4
   - `nvvmCreateProgram` ............................................ 5
   - `nvvmDestroyProgram` .......................................... 6
   - `nvvmGetCompiledResult` ...................................... 6
   - `nvvmGetCompiledResultSize` ................................. 7
   - `nvvmGetProgramLog` ............................................ 7
   - `nvvmGetProgramLogSize` ...................................... 8
   - `nvvmLazyAddModuleToProgram` ............................... 8
   - `nvvmVerifyProgram` ............................................ 9
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 nvvmIRVersion (int *majorIR, int *minorIR,
int *majorDbg, int *minorDbg)
Get the NVVM IR version.

Parameters
majorIR
   NVVM IR major version number.
minorIR
   NVVM IR minor version number.
majorDbg
   NVVM IR debug metadata major version number.
minorDbg
   NVVM IR debug metadata minor version number.

Returns
   - NVVM_SUCCESS

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. The module may have NVVM IR version 1.5 in LLVM 5.0 bitcode format. Alternatively, the module may have NVVM IR version 1.2 either in the LLVM 3.4 bitcode representation or in the LLVM 3.4 text representation. Support for reading the text representation of NVVM IR is deprecated and may be removed in a later version.
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, valid only with -opt=0)
‣ -generate-line-info (generate line number information)
‣ -opt=
  ‣ 0 (disable optimizations)
  ‣ 3 (default, enable optimizations)
‣ -arch=
  ‣ compute_30 (default)
  ‣ compute_32
  ‣ compute_35
  ‣ compute_37
• compute_50
• compute_52
• compute_53
• compute_60
• compute_61
• compute_62
• compute_70
• compute_72
• -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()

```c
nvvmResult nvvmDestroyProgram (nvvmProgram *prog)
```

Destroy a program.

**Parameters**

- **prog**: NVVM program.

**Returns**

- NVVM_SUCCESS
- NVVM_ERROR_INVALID_PROGRAM

**Description**

See also:

nvvmCreateProgram()

```c
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 nvvmLazyAddModuleToProgram (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 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. The module may have NVVM IR version 1.5 in LLVM 5.0 bitcode format. Alternatively, the module may have NVVM IR version 1.2 in the LLVM 3.4 bitcode representation.

A module added using this API is lazily loaded - the only symbols loaded are those that are required by module(s) loaded using nvvmAddModuleToProgram. It is an error for a program to have all modules loaded using this API. Compiler may also optimize entities in this module by making them internal to the linked NVVM IR module, making them eligible for other optimizations. Due to these optimizations, this API to load a module is more efficient and should be used where possible.

`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:

Same as for `nvvmCompileProgram()`.

See also:

`nvvmCompileProgram()`
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

© 2007-2019 NVIDIA Corporation. All rights reserved.