NVML API REFERENCE MANUAL

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Version 362.51

Contents

Chapter 1

Known issues in the current version of NVML library

This is a list of known NVML issues in the current driver:

- On Linux GPU Reset can't be triggered when there is pending GPU Operation Mode (GOM) change
- On Linux GPU Reset may not successfully change pending ECC mode. A full reboot may be required to enable the mode change.
- Accounting Statistics supports only one process per GPU at a time (CUDA proxy server counts as one process).
- nvmlAccountingStats_t::time reports time and utilization values starting from cuInit till process termination. Next driver versions might change this behavior slightly and account process only from cuCtxCreate till cuCtxDestroy.
- On GPUs from Fermi family current P0 clocks (reported by nvmlDeviceGetClockInfo) can differ from max clocks by few MHz.

Chapter 2

Change log of NVML library

This chapter list changes in API and bug fixes that were introduced to the library

2.1 Changes between NVML v346 Update and v349

The following new functionality is exposed on NVIDIA display drivers version 349 Production or later

- Updated nvmlDeviceGetMemoryInfo to report Used/Free memory under Windows WDDM mode
- Added nvmlDeviceGetTopologyCommonAncestor to find the common path between two devices
- Added nvmlDeviceGetTopologyNearestGpus to get a set of GPUs given a path level
- Added nvmlSystemGetTopologyGpuSet to retrieve a set of GPUs with a given CPU affinity
- Updated nvmlDeviceGetAccountingPids, nvmlDeviceGetAccountingBufferSize and nvmlDeviceGetAccountingStats to report accounting information for both active and terminated processes. The execution time field in nvmlAccountingStats_t structure is populated only when the process is terminated.

2.2 Changes between NVML v340 Update and v346

The following new functionality is exposed on NVIDIA display drivers version 346 Production or later

- added the public APIs nvmlDeviceGetPcieReplayCounter and nvmlDeviceGetPcieThroughput
- Discontinued Perl bindings support
- Added nvmlDeviceGetGraphicsRunningProcesses to get information about Graphics processes running on a GPU.

2.3 Changes between NVML v331 Update and v340

The following new functionality is exposed on NVIDIA display drivers version 340 Production or later

- Added nvmlDeviceGetSamples to get recent power, utilization and clock samples for the GPU.
- Added nvmlDeviceGetTemperatureThreshold to retrieve temperature threshold information.
- Added nvmlDeviceGetBrand to retrieve brand information (e.g. Tesla, Quadro, etc.)
- Added support for K40d and K80
- Added nvmlDeviceGetTopology internal API to retrieve path info between PCI devices (remove this for DITA)
- Added nvmlDeviceGetViolationStatus to get the duration of time during which the device was throttled (lower than requested clocks) due to thermal or power constraints.
- Added nvmlDeviceGetEncoderUtilization and nvmlDeviceGetDecoderUtilization APIs
- Added nvmlDeviceGetCpuAffinity to determine the closest processor(s) affinity to a specific GPU
- Added nvmlDeviceSetCpuAffinity to bind a specific GPU to the closest processor
- Added nvmlDeviceClearCpuAffinity to unbind a specific GPU
- Added nvmlDeviceGetBoardId to get a unique boardId for the running system

- Added nvmlDeviceGetMultiGpuBoard to get whether the device is on a multiGPU board
- Added nvmlDeviceGetAutoBoostedClocksEnabled and nvmlDeviceSetAutoBoostedClocksEnabled for querying and setting the state of auto boosted clocks on supporting hardware.
- Added nvmlDeviceSetDefaultAutoBoostedClocksEnabled for setting the default state of auto boosted clocks on supporting hardware.

2.4 Changes between NVML v5.319 Update and v331

The following new functionality is exposed on NVIDIA display drivers version 331 Production or later

- Added nvmlDeviceGetMinorNumber to get the minor number for the device.
- Added nvmlDeviceGetBAR1MemoryInfo to get BAR1 total, available and used memory size.
- Added nvmlDeviceGetBridgeChipInfo to get the information related to bridge chip firmware.
- Added enforced power limit query API nvmlDeviceGetEnforcedPowerLimit
- Updated nvmlEventSetWait to return xid event data in case of xid error event.
- Added support for K8

2.5 Changes between NVML v5.319 RC and v5.319 Update

The following new functionality is exposed on NVIDIA display drivers version 319 Update or later

- Added nvmlDeviceSetAPIRestriction and nvmlDeviceGetAPIRestriction, with initial ability to toggle root-only requirement for nvmlDeviceSetApplicationsClocks and nvmlDeviceResetApplicationsClocks.

2.6 Changes between NVML v4.304 and v5.319 RC

The following new functionality is exposed on NVIDIA display drivers version 319 Production or later

- IMPORTANT: Added _v2 versions of nvmlDeviceGetHandleByIndex and nvmlDeviceGetCount that also count devices not accessible by current user
  - IMPORTANT: nvmlDeviceGetHandleByIndex_v2 (default) can also return NVML_ERROR_NO_PERMISSION
- Added nvmlInit_v2 and nvmlDeviceGetHandleByIndex_v2 that is safer and thus recommended function for initializing the library
  - nvmlInit_v2 lazily initializes only requested devices (queried with nvmlDeviceGetHandle∗)
  - nvml.h defines nvmlInit_v2 and nvmlDeviceGetHandleByIndex_v2 as default functions
- Added nvmlDeviceGetIndex
- Added NVML_ERROR_GPU_IS_LOST to report GPUs that have fallen off the bus.
  - Note: All NVML device APIs can return this error code, as a GPU can fall off the bus at any time.

- Added new class of APIs for gathering process statistics (Accounting Statistics)
- Application Clocks are no longer supported on GPU's from Quadro product line
- Added APIs to support dynamic page retirement. See nvmlDeviceGetRetiredPages and nvmlDeviceGetRetiredPagesPendingStatus
- Renamed nvmlClocksThrottleReasonUserDefinedClocks to nvmlClocksThrottleReasonApplicationsClocksSetting. Old name is deprecated and can be removed in one of the next major releases.
- Added nvmlDeviceGetDisplayActive and updated documentation to clarify how it differs from nvmlDeviceGetDisplayMode

2.7 Changes between NVML v4.304 RC and v4.304 Production

The following new functionality is exposed on NVIDIA display drivers version 304 Production or later

- Added nvmlDeviceGetGpuOperationMode and nvmlDeviceSetGpuOperationMode

2.8 Changes between NVML v3.295 and v4.304 RC

The following new functionality is exposed on NVIDIA display drivers version 304 RC or later

- Added nvmlDeviceGetInforomConfigurationChecksum and nvmlDeviceValidateInforom
- Added new error return value for initialization failure due to kernel module not receiving interrupts
- Added nvmlDeviceSetApplicationsClocks, nvmlDeviceGetApplicationsClock, nvmlDeviceResetApplicationsClocks
- Added nvmlDeviceGetSupportedMemoryClocks and nvmlDeviceGetSupportedGraphicsClocks
- Added nvmlDeviceGetPowerManagementLimitConstraints, nvmlDeviceGetPowerManagementDefaultLimit and nvmlDeviceSetPowerManagementLimit
- Added nvmlDeviceGetInforomImageVersion
- Expanded nvmlDeviceGetUUID to support all CUDA capable GPUs
- Deprecated nvmlDeviceGetDetailedEccErrors in favor of nvmlDeviceGetMemoryErrorCounter
- Added NVML_MEMORY_LOCATION_TEXTURE_MEMORY to support reporting of texture memory error counters
- Added nvmlDeviceGetCurrentClocksThrottleReasons and nvmlDeviceGetSupportedClocksThrottleReasons
- NVML_CLOCK_SM is now also reported on supported Kepler devices.
- Dropped support for GT200 based Tesla brand GPUs: C1060, M1060, S1070

2.9 Changes between NVML v2.285 and v3.295

The following new functionality is exposed on NVIDIA display drivers version 295 or later

- deprecated nvmlDeviceGetHandleBySerial in favor of newly added nvmlDeviceGetHandleByUUID
- Marked the input parameters of nvmlDeviceGetHandleBySerial, nvmlDeviceGetHandleByUUID and nvmlDeviceGetHandleByPciBusId as const
- Added nvmlDeviceOnSameBoard
- Added Constants defines
- Added nvmlDeviceGetMaxPcieLinkGeneration, nvmlDeviceGetMaxPcieLinkWidth, nvmlDeviceGetCurrPcieLinkGeneration,nvmlDeviceGetCurrPcieLinkWidth
- Format change of nvmlDeviceGetUUID output to match the UUID standard. This function will return a different value.
- nvmlDeviceGetDetailedEccErrors will report zero for unsupported ECC error counters when a subset of ECC error counters are supported

2.10 Changes between NVML v1.0 and v2.285

The following new functionality is exposed on NVIDIA display drivers version 285 or later

- Added possibility to query separately current and pending driver model with nvmlDeviceGetDriverModel
- Added API nvmlDeviceGetVbiosVersion function to report VBIOS version.
- Added pciSubSystemId to nvmlPciInfo_t struct
- Added API nvmlErrorString function to convert error code to string
- Updated docs to indicate we support M2075 and C2075
- Added API nvmlSystemGetHicVersion function to report HIC firmware version
- Added NVML versioning support
  - Functions that changed API and/or size of structs have appended versioning suffix (e.g. nvmlDeviceGetPciInfo_v2). Appropriate C defines have been added that map old function names to the newer version of the function
- Added support for concurrent library usage by multiple libraries
- Added API nvmlDeviceGetMaxClockInfo function for reporting device's clock limits
- Added new error code NVML_ERROR_DRIVER_NOT_LOADED used by nvmlInit
- Extended nvmlPciInfo_t struct with new field: sub system id
- Added NVML support on Windows guest account
- Changed format of pciBusId string (to XXXX:XX:XX.X) of nvmlPciInfo_t
- Parsing of busId in nvmlDeviceGetHandleByPciBusId is less restrictive. You can pass 0:2:0.0 or 0000:02:00 and other variations

- Added API for events waiting for GPU events (Linux only) see docs of Event Handling Methods
- Added API nvmlDeviceGetComputeRunningProcesses and nvmlSystemGetProcessName functions for looking up currently running compute applications
- Deprecated nvmlDeviceGetPowerState in favor of nvmlDeviceGetPerformanceState.

Chapter 3

Deprecated List

Class nvmlEccErrorCounts_t Different GPU families can have different memory error counters See nvmlDeviceGetMemoryErrorCounter

Global NVML_DOUBLE_BIT_ECC Mapped to NVML_MEMORY_ERROR_TYPE_UNCORRECTED

Global NVML_SINGLE_BIT_ECC Mapped to NVML_MEMORY_ERROR_TYPE_CORRECTED

Global nvmlEccBitType_t See nvmlMemoryErrorType_t for a more flexible type

Global nvmlDeviceGetDetailedEccErrors This API supports only a fixed set of ECC error locations On different GPU architectures different locations are supported See nvmlDeviceGetMemoryErrorCounter

Global nvmlDeviceGetHandleBySerial Since more than one GPU can exist on a single board this function is deprecated in favor of nvmlDeviceGetHandleByUUID. For dual GPU boards this function will return NVML_ERROR_INVALID_ARGUMENT.

Global nvmlClocksThrottleReasonUserDefinedClocks Renamed to nvmlClocksThrottleReasonApplicationsClocksSetting as the name describes the situation more accurately.

Chapter 4

Module Index

4.1 Modules

Here is a list of all modules:

Chapter 5

Data Structure Index

5.1 Data Structures

Here are the data structures with brief descriptions:

Chapter 6

Module Documentation

6.1 Device Structs

Data Structures

- struct nvmlPciInfo_t
- struct nvmlEccErrorCounts_t
- struct nvmlUtilization_t
- struct nvmlMemory_t
- struct nvmlBAR1Memory_t
- struct nvmlProcessInfo_t
- struct nvmlNvLinkUtilizationControl_t
- struct nvmlBridgeChipInfo_t
- struct nvmlBridgeChipHierarchy_t
- union nvmlValue_t
- struct nvmlSample_t
- struct nvmlViolationTime_t

Defines

- #define NVML_VALUE_NOT_AVAILABLE (-1)
- #define NVML_DEVICE_PCI_BUS_ID_BUFFER_SIZE 16
- #define NVML_NVLINK_MAX_LINKS 4
- #define NVML_MAX_PHYSICAL_BRIDGE (128)

Enumerations

- enum nvmlBridgeChipType_t
- enum nvmlNvLinkUtilizationCountUnits_t
- enum nvmlNvLinkUtilizationCountPktTypes_t
- enum nvmlNvLinkCapability_t
- enum nvmlNvLinkErrorCounter_t
- enum nvmlGpuTopologyLevel_t

- enum nvmlSamplingType_t {
  NVML_TOTAL_POWER_SAMPLES = 0,
  NVML_GPU_UTILIZATION_SAMPLES = 1,
  NVML_MEMORY_UTILIZATION_SAMPLES = 2,
  NVML_ENC_UTILIZATION_SAMPLES = 3,
  NVML_DEC_UTILIZATION_SAMPLES = 4,
  NVML_PROCESSOR_CLK_SAMPLES = 5,
  NVML_MEMORY_CLK_SAMPLES = 6 }
- enum nvmlPcieUtilCounter_t
- enum nvmlValueType_t
- enum nvmlPerfPolicyType_t

6.1.1 Define Documentation

6.1.1.1 #define NVML_DEVICE_PCI_BUS_ID_BUFFER_SIZE 16

Buffer size guaranteed to be large enough for pci bus id

6.1.1.2 #define NVML_MAX_PHYSICAL_BRIDGE (128)

Maximum limit on Physical Bridges per Board

6.1.1.3 #define NVML_NVLINK_MAX_LINKS 4

Maximum number of NvLink links supported

6.1.1.4 #define NVML_VALUE_NOT_AVAILABLE (-1)

Special constant that some fields take when they are not available. Used when only part of the struct is not available.

Each structure explicitly states when to check for this value.

6.1.2 Enumeration Type Documentation

6.1.2.1 enum nvmlBridgeChipType_t

Enum to represent type of bridge chip

6.1.2.2 enum nvmlGpuTopologyLevel_t

Represents level relationships within a system between two GPUs The enums are spaced to allow for future relationships

6.1.2.3 enum nvmlNvLinkCapability_t

Enum to represent NvLink queryable capabilities

6.1.2.4 enum nvmlNvLinkErrorCounter_t

Enum to represent NvLink queryable error counters

6.1.2.5 enum nvmlNvLinkUtilizationCountPktTypes_t

Enum to represent the NvLink utilization counter packet types to count ∗∗ this is ONLY applicable with the units as packets or bytes ∗∗ as specified in *nvmlNvLinkUtilizationCountUnits_t* ∗∗ all packet filter descriptions are target GPU centric ∗∗ these can be "OR'd" together

6.1.2.6 enum nvmlNvLinkUtilizationCountUnits_t

Enum to represent the NvLink utilization counter packet units

6.1.2.7 enum nvmlPcieUtilCounter_t

Represents the queryable PCIe utilization counters

6.1.2.8 enum nvmlPerfPolicyType_t

Represents type of perf policy for which violation times can be queried

6.1.2.9 enum nvmlSamplingType_t

Represents Type of Sampling Event

Enumerator:

NVML_TOTAL_POWER_SAMPLES To represent total power drawn by GPU.

NVML_GPU_UTILIZATION_SAMPLES To represent percent of time during which one or more kernels was executing on the GPU.

NVML_MEMORY_UTILIZATION_SAMPLES To represent percent of time during which global (device) memory was being read or written.

NVML_ENC_UTILIZATION_SAMPLES To represent percent of time during which NVENC remains busy.

NVML_DEC_UTILIZATION_SAMPLES To represent percent of time during which NVDEC remains busy.

NVML_PROCESSOR_CLK_SAMPLES To represent processor clock samples.

NVML_MEMORY_CLK_SAMPLES To represent memory clock samples.

6.1.2.10 enum nvmlValueType_t

Represents the type for sample value returned

6.2 Device Enums

Defines

- #define nvmlFlagDefault 0x00

  Generic flag used to specify the default behavior of some functions. See description of particular functions for details.

- #define nvmlFlagForce 0x01

  Generic flag used to force some behavior. See description of particular functions for details.

- #define nvmlEccBitType_t nvmlMemoryErrorType_t
- #define NVML_SINGLE_BIT_ECC NVML_MEMORY_ERROR_TYPE_CORRECTED
- #define NVML_DOUBLE_BIT_ECC NVML_MEMORY_ERROR_TYPE_UNCORRECTED

Enumerations

- enum nvmlEnableState_t {
  NVML_FEATURE_DISABLED = 0,
  NVML_FEATURE_ENABLED = 1 }
- enum nvmlBrandType_t
- enum nvmlTemperatureThresholds_t
- enum nvmlTemperatureSensors_t { NVML_TEMPERATURE_GPU = 0 }
- enum nvmlComputeMode_t {
  NVML_COMPUTEMODE_DEFAULT = 0,
  NVML_COMPUTEMODE_EXCLUSIVE_THREAD = 1,
  NVML_COMPUTEMODE_PROHIBITED = 2,
  NVML_COMPUTEMODE_EXCLUSIVE_PROCESS = 3 }
- enum nvmlMemoryErrorType_t {
  NVML_MEMORY_ERROR_TYPE_CORRECTED = 0,
  NVML_MEMORY_ERROR_TYPE_UNCORRECTED = 1,
  NVML_MEMORY_ERROR_TYPE_COUNT }
- enum nvmlEccCounterType_t {
  NVML_VOLATILE_ECC = 0,
  NVML_AGGREGATE_ECC = 1,
  NVML_ECC_COUNTER_TYPE_COUNT }
- enum nvmlClockType_t {
  NVML_CLOCK_GRAPHICS = 0,
  NVML_CLOCK_SM = 1,
  NVML_CLOCK_MEM = 2,
  NVML_CLOCK_VIDEO = 3 }
- enum nvmlClockId_t {
  NVML_CLOCK_ID_CURRENT = 0,
  NVML_CLOCK_ID_APP_CLOCK_TARGET = 1,
  NVML_CLOCK_ID_APP_CLOCK_DEFAULT = 2,
  NVML_CLOCK_ID_CUSTOMER_BOOST_MAX = 3 }

- enum nvmlDriverModel_t {
  NVML_DRIVER_WDDM = 0,
  NVML_DRIVER_WDM = 1 }
- enum nvmlPstates_t {
  NVML_PSTATE_0 = 0,
  NVML_PSTATE_1 = 1,
  NVML_PSTATE_2 = 2,
  NVML_PSTATE_3 = 3,
  NVML_PSTATE_4 = 4,
  NVML_PSTATE_5 = 5,
  NVML_PSTATE_6 = 6,
  NVML_PSTATE_7 = 7,
  NVML_PSTATE_8 = 8,
  NVML_PSTATE_9 = 9,
  NVML_PSTATE_10 = 10,
  NVML_PSTATE_11 = 11,
  NVML_PSTATE_12 = 12,
  NVML_PSTATE_13 = 13,
  NVML_PSTATE_14 = 14,
  NVML_PSTATE_15 = 15,
  NVML_PSTATE_UNKNOWN = 32 }
- enum nvmlGpuOperationMode_t {
  NVML_GOM_ALL_ON = 0,
  NVML_GOM_COMPUTE = 1,
  NVML_GOM_LOW_DP = 2 }
- enum nvmlInforomObject_t {
  NVML_INFOROM_OEM = 0,
  NVML_INFOROM_ECC = 1,
  NVML_INFOROM_POWER = 2,
  NVML_INFOROM_COUNT }
- enum nvmlReturn_t {
  NVML_SUCCESS = 0,
  NVML_ERROR_UNINITIALIZED = 1,
  NVML_ERROR_INVALID_ARGUMENT = 2,
  NVML_ERROR_NOT_SUPPORTED = 3,
  NVML_ERROR_NO_PERMISSION = 4,
  NVML_ERROR_ALREADY_INITIALIZED = 5,
  NVML_ERROR_NOT_FOUND = 6,
  NVML_ERROR_INSUFFICIENT_SIZE = 7,
  NVML_ERROR_INSUFFICIENT_POWER = 8,
  NVML_ERROR_DRIVER_NOT_LOADED = 9,
  NVML_ERROR_TIMEOUT = 10,

NVML_ERROR_IRQ_ISSUE = 11,
NVML_ERROR_LIBRARY_NOT_FOUND = 12,
NVML_ERROR_FUNCTION_NOT_FOUND = 13,
NVML_ERROR_CORRUPTED_INFOROM = 14,
NVML_ERROR_GPU_IS_LOST = 15,
NVML_ERROR_RESET_REQUIRED = 16,
NVML_ERROR_OPERATING_SYSTEM = 17,
NVML_ERROR_LIB_RM_VERSION_MISMATCH = 18,
NVML_ERROR_IN_USE = 19,
NVML_ERROR_UNKNOWN = 999 }

- enum nvmlMemoryLocation_t {
  NVML_MEMORY_LOCATION_L1_CACHE = 0,
  NVML_MEMORY_LOCATION_L2_CACHE = 1,
  NVML_MEMORY_LOCATION_DEVICE_MEMORY = 2,
  NVML_MEMORY_LOCATION_REGISTER_FILE = 3,
  NVML_MEMORY_LOCATION_TEXTURE_MEMORY = 4,
  NVML_MEMORY_LOCATION_COUNT }
- enum nvmlPageRetirementCause_t {
  NVML_PAGE_RETIREMENT_CAUSE_MULTIPLE_SINGLE_BIT_ECC_ERRORS = 0,
  NVML_PAGE_RETIREMENT_CAUSE_DOUBLE_BIT_ECC_ERROR = 1 }
- enum nvmlRestrictedAPI_t {
  NVML_RESTRICTED_API_SET_APPLICATION_CLOCKS = 0,
  NVML_RESTRICTED_API_SET_AUTO_BOOSTED_CLOCKS = 1 }

6.2.1 Define Documentation

6.2.1.1 #define NVML_DOUBLE_BIT_ECC NVML_MEMORY_ERROR_TYPE_UNCORRECTED

Double bit ECC errors

Deprecated

Mapped to NVML_MEMORY_ERROR_TYPE_UNCORRECTED

6.2.1.2 #define NVML_SINGLE_BIT_ECC NVML_MEMORY_ERROR_TYPE_CORRECTED

Single bit ECC errors

Deprecated

Mapped to NVML_MEMORY_ERROR_TYPE_CORRECTED

6.2.1.3 #define nvmlEccBitType_t nvmlMemoryErrorType_t

ECC bit types.

Deprecated

See nvmlMemoryErrorType_t for a more flexible type

6.2.2 Enumeration Type Documentation

6.2.2.1 enum nvmlBrandType_t

∗ The Brand of the GPU

6.2.2.2 enum nvmlClockId_t

Clock Ids. These are used in combination with nvmlClockType_t to specify a single clock value.

Enumerator:

NVML_CLOCK_ID_CURRENT Current actual clock value.
NVML_CLOCK_ID_APP_CLOCK_TARGET Target application clock.
NVML_CLOCK_ID_APP_CLOCK_DEFAULT Default application clock target.
NVML_CLOCK_ID_CUSTOMER_BOOST_MAX OEM-defined maximum clock rate.

6.2.2.3 enum nvmlClockType_t

Clock types.

All speeds are in Mhz.

Enumerator:

NVML_CLOCK_GRAPHICS Graphics clock domain.
NVML_CLOCK_SM SM clock domain.
NVML_CLOCK_MEM Memory clock domain.
NVML_CLOCK_VIDEO Video encoder/decoder clock domain.

6.2.2.4 enum nvmlComputeMode_t

Compute mode.

NVML_COMPUTEMODE_EXCLUSIVE_PROCESS was added in CUDA 4.0. Earlier CUDA versions supported a single exclusive mode, which is equivalent to NVML_COMPUTEMODE_EXCLUSIVE_THREAD in CUDA 4.0 and beyond.

Enumerator:

NVML_COMPUTEMODE_DEFAULT Default compute mode – multiple contexts per device.
NVML_COMPUTEMODE_EXCLUSIVE_THREAD Support Removed.
NVML_COMPUTEMODE_PROHIBITED Compute-prohibited mode – no contexts per device.
NVML_COMPUTEMODE_EXCLUSIVE_PROCESS Compute-exclusive-process mode – only one context per device, usable from multiple threads at a time.

6.2.2.5 enum nvmlDriverModel_t

Driver models.

Windows only.

Enumerator:

NVML_DRIVER_WDDM WDDM driver model – GPU treated as a display device.

NVML_DRIVER_WDM WDM (TCC) model (recommended) – GPU treated as a generic device.

6.2.2.6 enum nvmlEccCounterType_t

ECC counter types.

Note: Volatile counts are reset each time the driver loads. On Windows this is once per boot. On Linux this can be more frequent. On Linux the driver unloads when no active clients exist. If persistence mode is enabled or there is always a driver client active (e.g. X11), then Linux also sees per-boot behavior. If not, volatile counts are reset each time a compute app is run.

Enumerator:

NVML_VOLATILE_ECC Volatile counts are reset each time the driver loads.

NVML_AGGREGATE_ECC Aggregate counts persist across reboots (i.e. for the lifetime of the device).

NVML_ECC_COUNTER_TYPE_COUNT Count of memory counter types.

6.2.2.7 enum nvmlEnableState_t

Generic enable/disable enum.

Enumerator:

NVML_FEATURE_DISABLED Feature disabled.

NVML_FEATURE_ENABLED Feature enabled.

6.2.2.8 enum nvmlGpuOperationMode_t

GPU Operation Mode

GOM allows to reduce power usage and optimize GPU throughput by disabling GPU features.

Each GOM is designed to meet specific user needs.

Enumerator:

NVML_GOM_ALL_ON Everything is enabled and running at full speed.

NVML_GOM_COMPUTE Designed for running only compute tasks. Graphics operations < are not allowed.

NVML_GOM_LOW_DP Designed for running graphics applications that don't require < high bandwidth double precision.

6.2.2.9 enum nvmlInforomObject_t

Available infoROM objects.

Enumerator:

NVML_INFOROM_OEM An object defined by OEM.

NVML_INFOROM_ECC The ECC object determining the level of ECC support.

NVML_INFOROM_POWER The power management object.

NVML_INFOROM_COUNT This counts the number of infoROM objects the driver knows about.

6.2.2.10 enum nvmlMemoryErrorType_t

Memory error types

Enumerator:

NVML_MEMORY_ERROR_TYPE_CORRECTED A memory error that was corrected
For ECC errors, these are single bit errors For Texture memory, these are errors fixed by resend

NVML_MEMORY_ERROR_TYPE_UNCORRECTED A memory error that was not corrected
For ECC errors, these are double bit errors For Texture memory, these are errors where the resend fails

NVML_MEMORY_ERROR_TYPE_COUNT Count of memory error types.

6.2.2.11 enum nvmlMemoryLocation_t

Memory locations

See nvmlDeviceGetMemoryErrorCounter

Enumerator:

NVML_MEMORY_LOCATION_L1_CACHE GPU L1 Cache.

NVML_MEMORY_LOCATION_L2_CACHE GPU L2 Cache.

NVML_MEMORY_LOCATION_DEVICE_MEMORY GPU Device Memory.

NVML_MEMORY_LOCATION_REGISTER_FILE GPU Register File.

NVML_MEMORY_LOCATION_TEXTURE_MEMORY GPU Texture Memory.

NVML_MEMORY_LOCATION_COUNT This counts the number of memory locations the driver knows about.

6.2.2.12 enum nvmlPageRetirementCause_t

Causes for page retirement

Enumerator:

NVML_PAGE_RETIREMENT_CAUSE_MULTIPLE_SINGLE_BIT_ECC_ERRORS Page was retired due to multiple single bit ECC error.

NVML_PAGE_RETIREMENT_CAUSE_DOUBLE_BIT_ECC_ERROR Page was retired due to double bit ECC error.

6.2.2.13 enum nvmlPstates_t

Allowed PStates.

Enumerator:

NVML_PSTATE_0 Performance state 0 – Maximum Performance.

NVML_PSTATE_1 Performance state 1.

NVML_PSTATE_2 Performance state 2.

NVML_PSTATE_3 Performance state 3.

NVML_PSTATE_4 Performance state 4.

NVML_PSTATE_5 Performance state 5.

NVML_PSTATE_6 Performance state 6.

NVML_PSTATE_7 Performance state 7.

NVML_PSTATE_8 Performance state 8.

NVML_PSTATE_9 Performance state 9.

NVML_PSTATE_10 Performance state 10.

NVML_PSTATE_11 Performance state 11.

NVML_PSTATE_12 Performance state 12.

NVML_PSTATE_13 Performance state 13.

NVML_PSTATE_14 Performance state 14.

NVML_PSTATE_15 Performance state 15 – Minimum Performance.

NVML_PSTATE_UNKNOWN Unknown performance state.

6.2.2.14 enum nvmlRestrictedAPI_t

API types that allow changes to default permission restrictions

Enumerator:

NVML_RESTRICTED_API_SET_APPLICATION_CLOCKS APIs that change application clocks, see nvmlDeviceSetApplicationsClocks < and see nvmlDeviceResetApplicationsClocks.

NVML_RESTRICTED_API_SET_AUTO_BOOSTED_CLOCKS APIs that enable/disable auto boosted clocks < see nvmlDeviceSetAutoBoostedClocksEnabled.

6.2.2.15 enum nvmlReturn_t

Return values for NVML API calls.

Enumerator:

NVML_SUCCESS The operation was successful.

NVML_ERROR_UNINITIALIZED NVML was not first initialized with nvmlInit().

NVML_ERROR_INVALID_ARGUMENT A supplied argument is invalid.

NVML_ERROR_NOT_SUPPORTED The requested operation is not available on target device.

NVML_ERROR_NO_PERMISSION The current user does not have permission for operation.

NVML_ERROR_ALREADY_INITIALIZED Deprecated: Multiple initializations are now allowed through ref counting.

NVML_ERROR_NOT_FOUND A query to find an object was unsuccessful.

NVML_ERROR_INSUFFICIENT_SIZE An input argument is not large enough.

NVML_ERROR_INSUFFICIENT_POWER A device's external power cables are not properly attached.

NVML_ERROR_DRIVER_NOT_LOADED NVIDIA driver is not loaded.

NVML_ERROR_TIMEOUT User provided timeout passed.

NVML_ERROR_IRQ_ISSUE NVIDIA Kernel detected an interrupt issue with a GPU.

NVML_ERROR_LIBRARY_NOT_FOUND NVML Shared Library couldn't be found or loaded.

NVML_ERROR_FUNCTION_NOT_FOUND Local version of NVML doesn't implement this function.

NVML_ERROR_CORRUPTED_INFOROM infoROM is corrupted

NVML_ERROR_GPU_IS_LOST The GPU has fallen off the bus or has otherwise become inaccessible.

NVML_ERROR_RESET_REQUIRED The GPU requires a reset before it can be used again.

NVML_ERROR_OPERATING_SYSTEM The GPU control device has been blocked by the operating system/cgroups.

NVML_ERROR_LIB_RM_VERSION_MISMATCH RM detects a driver/library version mismatch.

NVML_ERROR_IN_USE An operation cannot be performed because the GPU is currently in use.

NVML_ERROR_UNKNOWN An internal driver error occurred.

6.2.2.16 enum nvmlTemperatureSensors_t

Temperature sensors.

Enumerator:

NVML_TEMPERATURE_GPU Temperature sensor for the GPU die.

6.2.2.17 enum nvmlTemperatureThresholds_t

Temperature thresholds.

6.3 Unit Structs

Data Structures

- struct nvmlHwbcEntry_t
- struct nvmlLedState_t
- struct nvmlUnitInfo_t
- struct nvmlPSUInfo_t
- struct nvmlUnitFanInfo_t
- struct nvmlUnitFanSpeeds_t

Enumerations

- enum nvmlFanState_t {
  NVML_FAN_NORMAL = 0,
  NVML_FAN_FAILED = 1 }
- enum nvmlLedColor_t {
  NVML_LED_COLOR_GREEN = 0,
  NVML_LED_COLOR_AMBER = 1 }

6.3.1 Enumeration Type Documentation

6.3.1.1 enum nvmlFanState_t

Fan state enum.

Enumerator:

NVML_FAN_NORMAL Fan is working properly.

NVML_FAN_FAILED Fan has failed.

6.3.1.2 enum nvmlLedColor_t

Led color enum.

Enumerator:

NVML_LED_COLOR_GREEN GREEN, indicates good health.

NVML_LED_COLOR_AMBER AMBER, indicates problem.

6.4 Event Types

Defines

- #define nvmlEventTypeSingleBitEccError 0x0000000000000001LL
  Event about single bit ECC errors.
- #define nvmlEventTypeDoubleBitEccError 0x0000000000000002LL
  Event about double bit ECC errors.
- #define nvmlEventTypePState 0x0000000000000004LL
  Event about PState changes.
- #define nvmlEventTypeXidCriticalError 0x0000000000000008LL
  Event that Xid critical error occurred.
- #define nvmlEventTypeClock 0x0000000000000010LL
  Event about clock changes.
- #define nvmlEventTypeNone 0x0000000000000000LL
  Mask with no events.
- #define nvmlEventTypeAll
  Mask of all events.

6.4.1 Detailed Description

Event Types which user can be notified about. See description of particular functions for details.

See nvmlDeviceRegisterEvents and nvmlDeviceGetSupportedEventTypes to check which devices support each event.

Types can be combined with bitwise or operator '|' when passed to nvmlDeviceRegisterEvents

6.4.2 Define Documentation

6.4.2.1 #define nvmlEventTypeClock 0x0000000000000010LL

Kepler only

6.4.2.2 #define nvmlEventTypeDoubleBitEccError 0x0000000000000002LL

Note:

An uncorrected texture memory error is not an ECC error, so it does not generate a double bit event

6.4.2.3 #define nvmlEventTypePState 0x0000000000000004LL

Note:

On Fermi architecture PState changes are also an indicator that GPU is throttling down due to no work being executed on the GPU, power capping or thermal capping. In a typical situation, Fermi-based GPU should stay in P0 for the duration of the execution of the compute process.

6.4.2.4 #define nvmlEventTypeSingleBitEccError 0x0000000000000001LL

Note:

A corrected texture memory error is not an ECC error, so it does not generate a single bit event

6.5 Accounting Statistics

Data Structures

- struct nvmlAccountingStats_t

Functions

- nvmlReturn_t DECLDIR nvmlDeviceGetAccountingMode (nvmlDevice_t device, nvmlEnableState_t *mode)
- nvmlReturn_t DECLDIR nvmlDeviceGetAccountingStats (nvmlDevice_t device, unsigned int pid, nvmlAccountingStats_t *stats)
- nvmlReturn_t DECLDIR nvmlDeviceGetAccountingPids (nvmlDevice_t device, unsigned int *count, unsigned int *pids)
- nvmlReturn_t DECLDIR nvmlDeviceGetAccountingBufferSize (nvmlDevice_t device, unsigned int *bufferSize)
- nvmlReturn_t DECLDIR nvmlDeviceSetAccountingMode (nvmlDevice_t device, nvmlEnableState_t mode)
- nvmlReturn_t DECLDIR nvmlDeviceClearAccountingPids (nvmlDevice_t device)

6.5.1 Detailed Description

Set of APIs designed to provide per process information about usage of GPU.

Note:

All accounting statistics and accounting mode live in nvidia driver and reset to default (Disabled) when driver unloads. It is advised to run with persistence mode enabled.
Enabling accounting mode has no negative impact on the GPU performance.

6.5.2 Function Documentation

6.5.2.1 nvmlReturn_t DECLDIR nvmlDeviceClearAccountingPids (nvmlDevice_t *device*)

Clears accounting information about all processes that have already terminated.

For Kepler ™or newer fully supported devices. Requires root/admin permissions.

See nvmlDeviceGetAccountingMode See nvmlDeviceGetAccountingStats See nvmlDeviceSetAccountingMode

Parameters:

device The identifier of the target device

Returns:

- NVML_SUCCESS if accounting information has been cleared
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *device* are invalid
- NVML_ERROR_NOT_SUPPORTED if the device doesn't support this feature
- NVML_ERROR_NO_PERMISSION if the user doesn't have permission to perform this operation
- NVML_ERROR_UNKNOWN on any unexpected error

6.5.2.2 nvmlReturn_t DECLDIR nvmlDeviceGetAccountingBufferSize (nvmlDevice_t *device*, unsigned int * *bufferSize*)

Returns the number of processes that the circular buffer with accounting pids can hold.

For Kepler ™or newer fully supported devices.

This is the maximum number of processes that accounting information will be stored for before information about oldest processes will get overwritten by information about new processes.

Parameters:

device The identifier of the target device

bufferSize Reference in which to provide the size (in number of elements) of the circular buffer for accounting stats.

Returns:

- NVML_SUCCESS if buffer size was successfully retrieved
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *device* is invalid or *bufferSize* is NULL
- NVML_ERROR_NOT_SUPPORTED if the device doesn't support this feature or accounting mode is disabled
- NVML_ERROR_UNKNOWN on any unexpected error

See also:

nvmlDeviceGetAccountingStats
nvmlDeviceGetAccountingPids

6.5.2.3 nvmlReturn_t DECLDIR nvmlDeviceGetAccountingMode (nvmlDevice_t *device*, nvmlEnableState_t * *mode*)

Queries the state of per process accounting mode.

For Kepler ™or newer fully supported devices.

See nvmlDeviceGetAccountingStats for more details. See nvmlDeviceSetAccountingMode

Parameters:

device The identifier of the target device

mode Reference in which to return the current accounting mode

Returns:

- NVML_SUCCESS if the mode has been successfully retrieved
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *device* is invalid or *mode* are NULL
- NVML_ERROR_NOT_SUPPORTED if the device doesn't support this feature
- NVML_ERROR_UNKNOWN on any unexpected error

6.5.2.4 nvmlReturn_t DECLDIR nvmlDeviceGetAccountingPids (nvmlDevice_t *device*, unsigned int * *count*, unsigned int * *pids*)

Queries list of processes that can be queried for accounting stats. The list of processes returned can be in running or terminated state.

For Kepler ™or newer fully supported devices.

To just query the number of processes ready to be queried, call this function with *count = 0 and pids=NULL. The return code will be NVML_ERROR_INSUFFICIENT_SIZE, or NVML_SUCCESS if list is empty.

For more details see nvmlDeviceGetAccountingStats.

Note:

In case of PID collision some processes might not be accessible before the circular buffer is full.

Parameters:

device The identifier of the target device

count Reference in which to provide the *pids* array size, and to return the number of elements ready to be queried

pids Reference in which to return list of process ids

Returns:

- NVML_SUCCESS if pids were successfully retrieved
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *device* is invalid or *count* is NULL
- NVML_ERROR_NOT_SUPPORTED if the device doesn't support this feature or accounting mode is disabled
- NVML_ERROR_INSUFFICIENT_SIZE if *count* is too small (*count* is set to expected value)
- NVML_ERROR_UNKNOWN on any unexpected error

See also:

nvmlDeviceGetAccountingBufferSize

6.5.2.5 nvmlReturn_t DECLDIR nvmlDeviceGetAccountingStats (nvmlDevice_t *device*, unsigned int *pid*, nvmlAccountingStats_t * *stats*)

Queries process's accounting stats.

For Kepler ™or newer fully supported devices.

Accounting stats capture GPU utilization and other statistics across the lifetime of a process. Accounting stats can be queried during life time of the process and after its termination. The time field in nvmlAccountingStats_t is reported as 0 during the lifetime of the process and updated to actual running time after its termination. Accounting stats are kept in a circular buffer, newly created processes overwrite information about old processes.

See nvmlAccountingStats_t for description of each returned metric. List of processes that can be queried can be retrieved from nvmlDeviceGetAccountingPids.

Note:

Accounting Mode needs to be on. See nvmlDeviceGetAccountingMode.
Only compute and graphics applications stats can be queried. Monitoring applications stats can't be queried since they don't contribute to GPU utilization.
In case of pid collision stats of only the latest process (that terminated last) will be reported

Warning:

On Kepler devices per process statistics are accurate only if there's one process running on a GPU.

Parameters:

device The identifier of the target device

pid Process Id of the target process to query stats for

stats Reference in which to return the process's accounting stats

Returns:

- NVML_SUCCESS if stats have been successfully retrieved
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *device* is invalid or *stats* are NULL
- NVML_ERROR_NOT_FOUND if process stats were not found
- NVML_ERROR_NOT_SUPPORTED if the device doesn't support this feature or accounting mode is disabled
- NVML_ERROR_UNKNOWN on any unexpected error

See also:

nvmlDeviceGetAccountingBufferSize

6.5.2.6 nvmlReturn_t DECLDIR nvmlDeviceSetAccountingMode (nvmlDevice_t *device*, nvmlEnableState_t *mode*)

Enables or disables per process accounting.

For Kepler ™or newer fully supported devices. Requires root/admin permissions.

Note:

This setting is not persistent and will default to disabled after driver unloads. Enable persistence mode to be sure the setting doesn't switch off to disabled.
Enabling accounting mode has no negative impact on the GPU performance.
Disabling accounting clears all accounting pids information.

See nvmlDeviceGetAccountingMode See nvmlDeviceGetAccountingStats See nvmlDeviceClearAccountingPids

Parameters:

device The identifier of the target device

mode The target accounting mode

Returns:

- NVML_SUCCESS if the new mode has been set
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *device* or *mode* are invalid
- NVML_ERROR_NOT_SUPPORTED if the device doesn't support this feature
- NVML_ERROR_NO_PERMISSION if the user doesn't have permission to perform this operation
- NVML_ERROR_UNKNOWN on any unexpected error

6.6 Initialization and Cleanup

Functions

- nvmlReturn_t DECLDIR nvmlInit (void)
- nvmlReturn_t DECLDIR nvmlShutdown (void)

6.6.1 Detailed Description

This chapter describes the methods that handle NVML initialization and cleanup. It is the user's responsibility to call nvmlInit() before calling any other methods, and nvmlShutdown() once NVML is no longer being used.

6.6.2 Function Documentation

6.6.2.1 nvmlReturn_t DECLDIR nvmlInit (void)

Initialize NVML, but don't initialize any GPUs yet.

Note:

In NVML 5.319 new nvmlInit_v2 has replaced nvmlInit"_v1" (default in NVML 4.304 and older) that did initialize all GPU devices in the system.

This allows NVML to communicate with a GPU when other GPUs in the system are unstable or in a bad state. When using this API, GPUs are discovered and initialized in nvmlDeviceGetHandleBy∗ functions instead.

Note:

To contrast nvmlInit_v2 with nvmlInit"_v1", NVML 4.304 nvmlInit"_v1" will fail when any detected GPU is in a bad or unstable state.

For all products.

This method, should be called once before invoking any other methods in the library. A reference count of the number of initializations is maintained. Shutdown only occurs when the reference count reaches zero.

Returns:

- NVML_SUCCESS if NVML has been properly initialized
- NVML_ERROR_DRIVER_NOT_LOADED if NVIDIA driver is not running
- NVML_ERROR_NO_PERMISSION if NVML does not have permission to talk to the driver
- NVML_ERROR_UNKNOWN on any unexpected error

6.6.2.2 nvmlReturn_t DECLDIR nvmlShutdown (void)

Shut down NVML by releasing all GPU resources previously allocated with nvmlInit().

For all products.

This method should be called after NVML work is done, once for each call to nvmlInit() A reference count of the number of initializations is maintained. Shutdown only occurs when the reference count reaches zero. For backwards compatibility, no error is reported if nvmlShutdown() is called more times than nvmlInit().

Returns:

- NVML_SUCCESS if NVML has been properly shut down
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_UNKNOWN on any unexpected error

6.7 Error reporting

Functions

- const DECLDIR char ∗ nvmlErrorString (nvmlReturn_t result)

6.7.1 Detailed Description

This chapter describes helper functions for error reporting routines.

6.7.2 Function Documentation

6.7.2.1 const DECLDIR char∗ nvmlErrorString (nvmlReturn_t *result*)

Helper method for converting NVML error codes into readable strings.

For all products.

Parameters:

result NVML error code to convert

Returns:

String representation of the error.

6.8 Constants

Defines

- #define NVML_DEVICE_INFOROM_VERSION_BUFFER_SIZE 16
- #define NVML_DEVICE_UUID_BUFFER_SIZE 80
- #define NVML_DEVICE_PART_NUMBER_BUFFER_SIZE 80
- #define NVML_SYSTEM_DRIVER_VERSION_BUFFER_SIZE 80
- #define NVML_SYSTEM_NVML_VERSION_BUFFER_SIZE 80
- #define NVML_DEVICE_NAME_BUFFER_SIZE 64
- #define NVML_DEVICE_SERIAL_BUFFER_SIZE 30
- #define NVML_DEVICE_VBIOS_VERSION_BUFFER_SIZE 32

6.8.1 Define Documentation

6.8.1.1 #define NVML_DEVICE_INFOROM_VERSION_BUFFER_SIZE 16

Buffer size guaranteed to be large enough for nvmlDeviceGetInforomVersion and nvmlDeviceGetInforomImageVersion

6.8.1.2 #define NVML_DEVICE_NAME_BUFFER_SIZE 64

Buffer size guaranteed to be large enough for nvmlDeviceGetName

6.8.1.3 #define NVML_DEVICE_PART_NUMBER_BUFFER_SIZE 80

Buffer size guaranteed to be large enough for nvmlDeviceGetBoardPartNumber

6.8.1.4 #define NVML_DEVICE_SERIAL_BUFFER_SIZE 30

Buffer size guaranteed to be large enough for nvmlDeviceGetSerial

6.8.1.5 #define NVML_DEVICE_UUID_BUFFER_SIZE 80

Buffer size guaranteed to be large enough for nvmlDeviceGetUUID

6.8.1.6 #define NVML_DEVICE_VBIOS_VERSION_BUFFER_SIZE 32

Buffer size guaranteed to be large enough for nvmlDeviceGetVbiosVersion

6.8.1.7 #define NVML_SYSTEM_DRIVER_VERSION_BUFFER_SIZE 80

Buffer size guaranteed to be large enough for nvmlSystemGetDriverVersion

6.8.1.8 #define NVML_SYSTEM_NVML_VERSION_BUFFER_SIZE 80

Buffer size guaranteed to be large enough for nvmlSystemGetNVMLVersion

6.9 System Queries

Functions

- nvmlReturn_t DECLDIR nvmlSystemGetDriverVersion (char ∗version, unsigned int length)
- nvmlReturn_t DECLDIR nvmlSystemGetNVMLVersion (char ∗version, unsigned int length)
- nvmlReturn_t DECLDIR nvmlSystemGetProcessName (unsigned int pid, char ∗name, unsigned int length)

6.9.1 Detailed Description

This chapter describes the queries that NVML can perform against the local system. These queries are not device-specific.

6.9.2 Function Documentation

6.9.2.1 nvmlReturn_t DECLDIR nvmlSystemGetDriverVersion (char ∗ *version*, unsigned int *length*)

Retrieves the version of the system's graphics driver.

For all products.

The version identifier is an alphanumeric string. It will not exceed 80 characters in length (including the NULL terminator). See nvmlConstants::NVML_SYSTEM_DRIVER_VERSION_BUFFER_SIZE.

Parameters:

version Reference in which to return the version identifier

length The maximum allowed length of the string returned in *version*

Returns:

- NVML_SUCCESS if *version* has been set
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *version* is NULL
- NVML_ERROR_INSUFFICIENT_SIZE if *length* is too small

6.9.2.2 nvmlReturn_t DECLDIR nvmlSystemGetNVMLVersion (char ∗ *version*, unsigned int *length*)

Retrieves the version of the NVML library.

For all products.

The version identifier is an alphanumeric string. It will not exceed 80 characters in length (including the NULL terminator). See nvmlConstants::NVML_SYSTEM_NVML_VERSION_BUFFER_SIZE.

Parameters:

version Reference in which to return the version identifier

length The maximum allowed length of the string returned in *version*

Returns:

- NVML_SUCCESS if *version* has been set

- NVML_ERROR_INVALID_ARGUMENT if *version* is NULL
- NVML_ERROR_INSUFFICIENT_SIZE if *length* is too small

6.9.2.3 nvmlReturn_t DECLDIR nvmlSystemGetProcessName (unsigned int *pid*, char * *name*, unsigned int *length*)

Gets name of the process with provided process id

For all products.

Returned process name is cropped to provided length. name string is encoded in ANSI.

Parameters:

pid The identifier of the process

name Reference in which to return the process name

length The maximum allowed length of the string returned in *name*

Returns:

- NVML_SUCCESS if *name* has been set
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *name* is NULL or *length* is 0.
- NVML_ERROR_NOT_FOUND if process doesn't exists
- NVML_ERROR_NO_PERMISSION if the user doesn't have permission to perform this operation
- NVML_ERROR_UNKNOWN on any unexpected error

6.10 Unit Queries

Functions

- nvmlReturn_t DECLDIR nvmlUnitGetCount (unsigned int *unitCount)
- nvmlReturn_t DECLDIR nvmlUnitGetHandleByIndex (unsigned int index, nvmlUnit_t *unit)
- nvmlReturn_t DECLDIR nvmlUnitGetUnitInfo (nvmlUnit_t unit, nvmlUnitInfo_t *info)
- nvmlReturn_t DECLDIR nvmlUnitGetLedState (nvmlUnit_t unit, nvmlLedState_t *state)
- nvmlReturn_t DECLDIR nvmlUnitGetPsuInfo (nvmlUnit_t unit, nvmlPSUInfo_t *psu)
- nvmlReturn_t DECLDIR nvmlUnitGetTemperature (nvmlUnit_t unit, unsigned int type, unsigned int *temp)
- nvmlReturn_t DECLDIR nvmlUnitGetFanSpeedInfo (nvmlUnit_t unit, nvmlUnitFanSpeeds_t *fanSpeeds)
- nvmlReturn_t DECLDIR nvmlUnitGetDevices (nvmlUnit_t unit, unsigned int *deviceCount, nvmlDevice_t *devices)
- nvmlReturn_t DECLDIR nvmlSystemGetHicVersion (unsigned int *hwbcCount, nvmlHwbcEntry_t *hwbcEntries)

6.10.1 Detailed Description

This chapter describes that queries that NVML can perform against each unit. For S-class systems only. In each case the device is identified with an nvmlUnit_t handle. This handle is obtained by calling nvmlUnitGetHandleByIndex().

6.10.2 Function Documentation

6.10.2.1 nvmlReturn_t DECLDIR nvmlSystemGetHicVersion (unsigned int * *hwbcCount*, nvmlHwbcEntry_t * *hwbcEntries*)

Retrieves the IDs and firmware versions for any Host Interface Cards (HICs) in the system.

For S-class products.

The *hwbcCount* argument is expected to be set to the size of the input *hwbcEntries* array. The HIC must be connected to an S-class system for it to be reported by this function.

Parameters:

hwbcCount Size of hwbcEntries array

hwbcEntries Array holding information about hwbc

Returns:

- NVML_SUCCESS if *hwbcCount* and *hwbcEntries* have been populated
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if either *hwbcCount* or *hwbcEntries* is NULL
- NVML_ERROR_INSUFFICIENT_SIZE if *hwbcCount* indicates that the *hwbcEntries* array is too small

6.10.2.2 nvmlReturn_t DECLDIR nvmlUnitGetCount (unsigned int * *unitCount*)

Retrieves the number of units in the system.

For S-class products.

Parameters:

unitCount Reference in which to return the number of units

Returns:

- NVML_SUCCESS if *unitCount* has been set
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *unitCount* is NULL
- NVML_ERROR_UNKNOWN on any unexpected error

6.10.2.3 nvmlReturn_t DECLDIR nvmlUnitGetDevices (nvmlUnit_t *unit*, unsigned int * *deviceCount*, nvmlDevice_t * *devices*)

Retrieves the set of GPU devices that are attached to the specified unit.

For S-class products.

The *deviceCount* argument is expected to be set to the size of the input *devices* array.

Parameters:

unit The identifier of the target unit

deviceCount Reference in which to provide the *devices* array size, and to return the number of attached GPU devices

devices Reference in which to return the references to the attached GPU devices

Returns:

- NVML_SUCCESS if *deviceCount* and *devices* have been populated
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INSUFFICIENT_SIZE if *deviceCount* indicates that the *devices* array is too small
- NVML_ERROR_INVALID_ARGUMENT if *unit* is invalid, either of *deviceCount* or *devices* is NULL
- NVML_ERROR_UNKNOWN on any unexpected error

6.10.2.4 nvmlReturn_t DECLDIR nvmlUnitGetFanSpeedInfo (nvmlUnit_t *unit*, nvmlUnitFanSpeeds_t * *fanSpeeds*)

Retrieves the fan speed readings for the unit.

For S-class products.

See nvmlUnitFanSpeeds_t for details on available fan speed info.

Parameters:

unit The identifier of the target unit

fanSpeeds Reference in which to return the fan speed information

Returns:

- NVML_SUCCESS if *fanSpeeds* has been populated
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *unit* is invalid or *fanSpeeds* is NULL
- NVML_ERROR_NOT_SUPPORTED if this is not an S-class product
- NVML_ERROR_UNKNOWN on any unexpected error

6.10.2.5 nvmlReturn_t DECLDIR nvmlUnitGetHandleByIndex (unsigned int *index*, nvmlUnit_t * *unit*)

Acquire the handle for a particular unit, based on its index.

For S-class products.

Valid indices are derived from the *unitCount* returned by nvmlUnitGetCount(). For example, if *unitCount* is 2 the valid indices are 0 and 1, corresponding to UNIT 0 and UNIT 1.

The order in which NVML enumerates units has no guarantees of consistency between reboots.

Parameters:

index The index of the target unit, >= 0 and < *unitCount*

unit Reference in which to return the unit handle

Returns:

- NVML_SUCCESS if *unit* has been set
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *index* is invalid or *unit* is NULL
- NVML_ERROR_UNKNOWN on any unexpected error

6.10.2.6 nvmlReturn_t DECLDIR nvmlUnitGetLedState (nvmlUnit_t *unit*, nvmlLedState_t * *state*)

Retrieves the LED state associated with this unit.

For S-class products.

See nvmlLedState_t for details on allowed states.

Parameters:

unit The identifier of the target unit

state Reference in which to return the current LED state

Returns:

- NVML_SUCCESS if *state* has been set
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *unit* is invalid or *state* is NULL
- NVML_ERROR_NOT_SUPPORTED if this is not an S-class product
- NVML_ERROR_UNKNOWN on any unexpected error

See also:

nvmlUnitSetLedState()

6.10.2.7 nvmlReturn_t DECLDIR nvmlUnitGetPsuInfo (nvmlUnit_t *unit*, nvmlPSUInfo_t * *psu*)

Retrieves the PSU stats for the unit.

For S-class products.

See nvmlPSUInfo_t for details on available PSU info.

Parameters:

unit The identifier of the target unit

psu Reference in which to return the PSU information

Returns:

- NVML_SUCCESS if *psu* has been populated
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *unit* is invalid or *psu* is NULL
- NVML_ERROR_NOT_SUPPORTED if this is not an S-class product
- NVML_ERROR_UNKNOWN on any unexpected error

6.10.2.8 nvmlReturn_t DECLDIR nvmlUnitGetTemperature (nvmlUnit_t *unit*, unsigned int *type*, unsigned int * *temp*)

Retrieves the temperature readings for the unit, in degrees C.

For S-class products.

Depending on the product, readings may be available for intake (type=0), exhaust (type=1) and board (type=2).

Parameters:

unit The identifier of the target unit

type The type of reading to take

temp Reference in which to return the intake temperature

Returns:

- NVML_SUCCESS if *temp* has been populated
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *unit* or *type* is invalid or *temp* is NULL
- NVML_ERROR_NOT_SUPPORTED if this is not an S-class product
- NVML_ERROR_UNKNOWN on any unexpected error

6.10.2.9 nvmlReturn_t DECLDIR nvmlUnitGetUnitInfo (nvmlUnit_t *unit*, nvmlUnitInfo_t * *info*)

Retrieves the static information associated with a unit.

For S-class products.

See nvmlUnitInfo_t for details on available unit info.

Parameters:

unit The identifier of the target unit

info Reference in which to return the unit information

Returns:

- NVML_SUCCESS if *info* has been populated
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *unit* is invalid or *info* is NULL

6.11 Device Queries

Functions

- nvmlReturn_t DECLDIR nvmlDeviceGetCount (unsigned int *deviceCount)
- nvmlReturn_t DECLDIR nvmlDeviceGetHandleByIndex (unsigned int index, nvmlDevice_t *device)
- nvmlReturn_t DECLDIR nvmlDeviceGetHandleBySerial (const char *serial, nvmlDevice_t *device)
- nvmlReturn_t DECLDIR nvmlDeviceGetHandleByUUID (const char *uuid, nvmlDevice_t *device)
- nvmlReturn_t DECLDIR nvmlDeviceGetHandleByPciBusId (const char *pciBusId, nvmlDevice_t *device)
- nvmlReturn_t DECLDIR nvmlDeviceGetName (nvmlDevice_t device, char *name, unsigned int length)
- nvmlReturn_t DECLDIR nvmlDeviceGetBrand (nvmlDevice_t device, nvmlBrandType_t *type)
- nvmlReturn_t DECLDIR nvmlDeviceGetIndex (nvmlDevice_t device, unsigned int *index)
- nvmlReturn_t DECLDIR nvmlDeviceGetSerial (nvmlDevice_t device, char *serial, unsigned int length)
- nvmlReturn_t DECLDIR nvmlDeviceGetCpuAffinity (nvmlDevice_t device, unsigned int cpuSetSize, unsigned long *cpuSet)
- nvmlReturn_t DECLDIR nvmlDeviceSetCpuAffinity (nvmlDevice_t device)
- nvmlReturn_t DECLDIR nvmlDeviceClearCpuAffinity (nvmlDevice_t device)
- nvmlReturn_t DECLDIR nvmlDeviceGetTopologyCommonAncestor (nvmlDevice_t device1, nvmlDevice_t device2, nvmlGpuTopologyLevel_t *pathInfo)
- nvmlReturn_t DECLDIR nvmlDeviceGetTopologyNearestGpus (nvmlDevice_t device, nvmlGpuTopologyLevel_t level, unsigned int *count, nvmlDevice_t *deviceArray)
- nvmlReturn_t DECLDIR nvmlSystemGetTopologyGpuSet (unsigned int cpuNumber, unsigned int *count, nvmlDevice_t *deviceArray)
- nvmlReturn_t DECLDIR nvmlDeviceGetUUID (nvmlDevice_t device, char *uuid, unsigned int length)
- nvmlReturn_t DECLDIR nvmlDeviceGetMinorNumber (nvmlDevice_t device, unsigned int *minorNumber)
- nvmlReturn_t DECLDIR nvmlDeviceGetBoardPartNumber (nvmlDevice_t device, char *partNumber, unsigned int length)
- nvmlReturn_t DECLDIR nvmlDeviceGetInforomVersion (nvmlDevice_t device, nvmlInforomObject_t object, char *version, unsigned int length)
- nvmlReturn_t DECLDIR nvmlDeviceGetInforomImageVersion (nvmlDevice_t device, char *version, unsigned int length)
- nvmlReturn_t DECLDIR nvmlDeviceGetInforomConfigurationChecksum (nvmlDevice_t device, unsigned int *checksum)
- nvmlReturn_t DECLDIR nvmlDeviceValidateInforom (nvmlDevice_t device)
- nvmlReturn_t DECLDIR nvmlDeviceGetDisplayMode (nvmlDevice_t device, nvmlEnableState_t *display)
- nvmlReturn_t DECLDIR nvmlDeviceGetDisplayActive (nvmlDevice_t device, nvmlEnableState_t *isActive)
- nvmlReturn_t DECLDIR nvmlDeviceGetPersistenceMode (nvmlDevice_t device, nvmlEnableState_t *mode)
- nvmlReturn_t DECLDIR nvmlDeviceGetPciInfo (nvmlDevice_t device, nvmlPciInfo_t *pci)
- nvmlReturn_t DECLDIR nvmlDeviceGetMaxPcieLinkGeneration (nvmlDevice_t device, unsigned int *maxLinkGen)
- nvmlReturn_t DECLDIR nvmlDeviceGetMaxPcieLinkWidth (nvmlDevice_t device, unsigned int *maxLinkWidth)
- nvmlReturn_t DECLDIR nvmlDeviceGetCurrPcieLinkGeneration (nvmlDevice_t device, unsigned int *currLinkGen)
- nvmlReturn_t DECLDIR nvmlDeviceGetCurrPcieLinkWidth (nvmlDevice_t device, unsigned int *currLinkWidth)
- nvmlReturn_t DECLDIR nvmlDeviceGetPcieThroughput (nvmlDevice_t device, nvmlPcieUtilCounter_t counter, unsigned int *value)
- nvmlReturn_t DECLDIR nvmlDeviceGetPcieReplayCounter (nvmlDevice_t device, unsigned int *value)
- nvmlReturn_t DECLDIR nvmlDeviceGetClockInfo (nvmlDevice_t device, nvmlClockType_t type, unsigned int *clock)

- nvmlReturn_t DECLDIR nvmlDeviceGetMaxClockInfo (nvmlDevice_t device, nvmlClockType_t type, unsigned int *clock)
- nvmlReturn_t DECLDIR nvmlDeviceGetApplicationsClock (nvmlDevice_t device, nvmlClockType_t clockType, unsigned int *clockMHz)
- nvmlReturn_t DECLDIR nvmlDeviceGetDefaultApplicationsClock (nvmlDevice_t device, nvmlClockType_t clockType, unsigned int *clockMHz)
- nvmlReturn_t DECLDIR nvmlDeviceResetApplicationsClocks (nvmlDevice_t device)
- nvmlReturn_t DECLDIR nvmlDeviceGetClock (nvmlDevice_t device, nvmlClockType_t clockType, nvmlClockId_t clockId, unsigned int *clockMHz)
- nvmlReturn_t DECLDIR nvmlDeviceGetMaxCustomerBoostClock (nvmlDevice_t device, nvmlClockType_t clockType, unsigned int *clockMHz)
- nvmlReturn_t DECLDIR nvmlDeviceGetSupportedMemoryClocks (nvmlDevice_t device, unsigned int *count, unsigned int *clocksMHz)
- nvmlReturn_t DECLDIR nvmlDeviceGetSupportedGraphicsClocks (nvmlDevice_t device, unsigned int memoryClockMHz, unsigned int *count, unsigned int *clocksMHz)
- nvmlReturn_t DECLDIR nvmlDeviceGetAutoBoostedClocksEnabled (nvmlDevice_t device, nvmlEnableState_t *isEnabled, nvmlEnableState_t *defaultIsEnabled)
- nvmlReturn_t DECLDIR nvmlDeviceSetAutoBoostedClocksEnabled (nvmlDevice_t device, nvmlEnableState_t enabled)
- nvmlReturn_t DECLDIR nvmlDeviceSetDefaultAutoBoostedClocksEnabled (nvmlDevice_t device, nvmlEnableState_t enabled, unsigned int flags)
- nvmlReturn_t DECLDIR nvmlDeviceGetFanSpeed (nvmlDevice_t device, unsigned int *speed)
- nvmlReturn_t DECLDIR nvmlDeviceGetTemperature (nvmlDevice_t device, nvmlTemperatureSensors_t sensorType, unsigned int *temp)
- nvmlReturn_t DECLDIR nvmlDeviceGetTemperatureThreshold (nvmlDevice_t device, nvmlTemperatureThresholds_t thresholdType, unsigned int *temp)
- nvmlReturn_t DECLDIR nvmlDeviceGetPerformanceState (nvmlDevice_t device, nvmlPstates_t *pState)
- nvmlReturn_t DECLDIR nvmlDeviceGetCurrentClocksThrottleReasons (nvmlDevice_t device, unsigned long long *clocksThrottleReasons)
- nvmlReturn_t DECLDIR nvmlDeviceGetSupportedClocksThrottleReasons (nvmlDevice_t device, unsigned long long *supportedClocksThrottleReasons)
- nvmlReturn_t DECLDIR nvmlDeviceGetPowerState (nvmlDevice_t device, nvmlPstates_t *pState)
- nvmlReturn_t DECLDIR nvmlDeviceGetPowerManagementMode (nvmlDevice_t device, nvmlEnableState_t *mode)
- nvmlReturn_t DECLDIR nvmlDeviceGetPowerManagementLimit (nvmlDevice_t device, unsigned int *limit)
- nvmlReturn_t DECLDIR nvmlDeviceGetPowerManagementLimitConstraints (nvmlDevice_t device, unsigned int *minLimit, unsigned int *maxLimit)
- nvmlReturn_t DECLDIR nvmlDeviceGetPowerManagementDefaultLimit (nvmlDevice_t device, unsigned int *defaultLimit)
- nvmlReturn_t DECLDIR nvmlDeviceGetPowerUsage (nvmlDevice_t device, unsigned int *power)
- nvmlReturn_t DECLDIR nvmlDeviceGetEnforcedPowerLimit (nvmlDevice_t device, unsigned int *limit)
- nvmlReturn_t DECLDIR nvmlDeviceGetGpuOperationMode (nvmlDevice_t device, nvmlGpuOperationMode_t *current, nvmlGpuOperationMode_t *pending)
- nvmlReturn_t DECLDIR nvmlDeviceGetMemoryInfo (nvmlDevice_t device, nvmlMemory_t *memory)
- nvmlReturn_t DECLDIR nvmlDeviceGetComputeMode (nvmlDevice_t device, nvmlComputeMode_t *mode)
- nvmlReturn_t DECLDIR nvmlDeviceGetEccMode (nvmlDevice_t device, nvmlEnableState_t *current, nvmlEnableState_t *pending)
- nvmlReturn_t DECLDIR nvmlDeviceGetBoardId (nvmlDevice_t device, unsigned int *boardId)
- nvmlReturn_t DECLDIR nvmlDeviceGetMultiGpuBoard (nvmlDevice_t device, unsigned int *multiGpuBool)
- nvmlReturn_t DECLDIR nvmlDeviceGetTotalEccErrors (nvmlDevice_t device, nvmlMemoryErrorType_t errorType, nvmlEccCounterType_t counterType, unsigned long long *eccCounts)

- nvmlReturn_t DECLDIR nvmlDeviceGetDetailedEccErrors (nvmlDevice_t device, nvmlMemoryErrorType_t errorType, nvmlEccCounterType_t counterType, nvmlEccErrorCounts_t *eccCounts)
- nvmlReturn_t DECLDIR nvmlDeviceGetMemoryErrorCounter (nvmlDevice_t device, nvmlMemoryErrorType_t errorType, nvmlEccCounterType_t counterType, nvmlMemoryLocation_t locationType, unsigned long long *count)
- nvmlReturn_t DECLDIR nvmlDeviceGetUtilizationRates (nvmlDevice_t device, nvmlUtilization_t *utilization)
- nvmlReturn_t DECLDIR nvmlDeviceGetEncoderUtilization (nvmlDevice_t device, unsigned int *utilization, unsigned int *samplingPeriodUs)
- nvmlReturn_t DECLDIR nvmlDeviceGetDecoderUtilization (nvmlDevice_t device, unsigned int *utilization, unsigned int *samplingPeriodUs)
- nvmlReturn_t DECLDIR nvmlDeviceGetDriverModel (nvmlDevice_t device, nvmlDriverModel_t *current, nvmlDriverModel_t *pending)
- nvmlReturn_t DECLDIR nvmlDeviceGetVbiosVersion (nvmlDevice_t device, char *version, unsigned int length)
- nvmlReturn_t DECLDIR nvmlDeviceGetBridgeChipInfo (nvmlDevice_t device, nvmlBridgeChipHierarchy_t *bridgeHierarchy)
- nvmlReturn_t DECLDIR nvmlDeviceGetComputeRunningProcesses (nvmlDevice_t device, unsigned int *infoCount, nvmlProcessInfo_t *infos)
- nvmlReturn_t DECLDIR nvmlDeviceGetGraphicsRunningProcesses (nvmlDevice_t device, unsigned int *infoCount, nvmlProcessInfo_t *infos)
- nvmlReturn_t DECLDIR nvmlDeviceOnSameBoard (nvmlDevice_t device1, nvmlDevice_t device2, int *onSameBoard)
- nvmlReturn_t DECLDIR nvmlDeviceGetAPIRestriction (nvmlDevice_t device, nvmlRestrictedAPI_t apiType, nvmlEnableState_t *isRestricted)
- nvmlReturn_t DECLDIR nvmlDeviceGetSamples (nvmlDevice_t device, nvmlSamplingType_t type, unsigned long long lastSeenTimeStamp, nvmlValueType_t *sampleValType, unsigned int *sampleCount, nvmlSample_t *samples)
- nvmlReturn_t DECLDIR nvmlDeviceGetBAR1MemoryInfo (nvmlDevice_t device, nvmlBAR1Memory_t *bar1Memory)
- nvmlReturn_t DECLDIR nvmlDeviceGetViolationStatus (nvmlDevice_t device, nvmlPerfPolicyType_t perfPolicyType, nvmlViolationTime_t *violTime)
- nvmlReturn_t DECLDIR nvmlDeviceGetRetiredPages (nvmlDevice_t device, nvmlPageRetirementCause_t cause, unsigned int *pageCount, unsigned long long *addresses)
- nvmlReturn_t DECLDIR nvmlDeviceGetRetiredPagesPendingStatus (nvmlDevice_t device, nvmlEnableState_t *isPending)

6.11.1 Detailed Description

This chapter describes that queries that NVML can perform against each device. In each case the device is identified with an nvmlDevice_t handle. This handle is obtained by calling one of nvmlDeviceGetHandleByIndex(), nvmlDeviceGetHandleBySerial(), nvmlDeviceGetHandleByPciBusId(). or nvmlDeviceGetHandleByUUID().

6.11.2 Function Documentation

6.11.2.1 nvmlReturn_t DECLDIR nvmlDeviceClearCpuAffinity (nvmlDevice_t *device*)

Clear all affinity bindings for the calling thread. Note, this is a change as of version 8.0 as older versions cleared the affinity for a calling process and all children.

For Kepler ™or newer fully supported devices. Supported on Linux only.

Parameters:

device The identifier of the target device

Returns:

- NVML_SUCCESS if the calling process has been successfully unbound
- NVML_ERROR_INVALID_ARGUMENT if *device* is invalid
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_UNKNOWN on any unexpected error

6.11.2.2 nvmlReturn_t DECLDIR nvmlDeviceGetAPIRestriction (nvmlDevice_t *device*, nvmlRestrictedAPI_t *apiType*, nvmlEnableState_t * *isRestricted*)

Retrieves the root/admin permissions on the target API. See *nvmlRestrictedAPI_t* for the list of supported APIs. If an API is restricted only root users can call that API. See *nvmlDeviceSetAPIRestriction* to change current permissions.

For all fully supported products.

Parameters:

device The identifier of the target device

apiType Target API type for this operation

isRestricted Reference in which to return the current restriction NVML_FEATURE_ENABLED indicates that the API is root-only NVML_FEATURE_DISABLED indicates that the API is accessible to all users

Returns:

- NVML_SUCCESS if *isRestricted* has been set
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *device* is invalid, *apiType* incorrect or *isRestricted* is NULL
- NVML_ERROR_NOT_SUPPORTED if this query is not supported by the device or the device does not support the feature that is being queried (E.G. Enabling/disabling auto boosted clocks is not supported by the device)
- NVML_ERROR_GPU_IS_LOST if the target GPU has fallen off the bus or is otherwise inaccessible
- NVML_ERROR_UNKNOWN on any unexpected error

See also:

nvmlRestrictedAPI_t

6.11.2.3 nvmlReturn_t DECLDIR nvmlDeviceGetApplicationsClock (nvmlDevice_t *device*, nvmlClockType_t *clockType*, unsigned int * *clockMHz*)

Retrieves the current setting of a clock that applications will use unless an overspec situation occurs. Can be changed using nvmlDeviceSetApplicationsClocks.

For Kepler ™or newer fully supported devices.

Parameters:

device The identifier of the target device

clockType Identify which clock domain to query

clockMHz Reference in which to return the clock in MHz

Returns:

- NVML_SUCCESS if *clockMHz* has been set
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *device* is invalid or *clockMHz* is NULL or *clockType* is invalid
- NVML_ERROR_NOT_SUPPORTED if the device does not support this feature
- NVML_ERROR_GPU_IS_LOST if the target GPU has fallen off the bus or is otherwise inaccessible
- NVML_ERROR_UNKNOWN on any unexpected error

6.11.2.4 nvmlReturn_t DECLDIR nvmlDeviceGetAutoBoostedClocksEnabled (nvmlDevice_t *device*, nvmlEnableState_t * *isEnabled*, nvmlEnableState_t * *defaultIsEnabled*)

Retrieve the current state of auto boosted clocks on a device and store it in *isEnabled*

For Kepler ™or newer fully supported devices.

Auto boosted clocks are enabled by default on some hardware, allowing the GPU to run at higher clock rates to maximize performance as thermal limits allow.

Parameters:

device The identifier of the target device

isEnabled Where to store the current state of auto boosted clocks of the target device

defaultIsEnabled Where to store the default auto boosted clocks behavior of the target device that the device will revert to when no applications are using the GPU

Returns:

- NVML_SUCCESS If *isEnabled* has been been set with the auto boosted clocks state of *device*
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *device* is invalid or *isEnabled* is NULL
- NVML_ERROR_NOT_SUPPORTED if the device does not support auto boosted clocks
- NVML_ERROR_GPU_IS_LOST if the target GPU has fallen off the bus or is otherwise inaccessible
- NVML_ERROR_UNKNOWN on any unexpected error

6.11.2.5 nvmlReturn_t DECLDIR nvmlDeviceGetBAR1MemoryInfo (nvmlDevice_t *device*, nvmlBAR1Memory_t * *bar1Memory*)

Gets Total, Available and Used size of BAR1 memory.

BAR1 is used to map the FB (device memory) so that it can be directly accessed by the CPU or by 3rd party devices (peer-to-peer on the PCIE bus).

For Kepler ™or newer fully supported devices.

Parameters:

device The identifier of the target device

bar1Memory Reference in which BAR1 memory information is returned.

Returns:

- NVML_SUCCESS if BAR1 memory is successfully retrieved
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *device* is invalid, *bar1Memory* is NULL
- NVML_ERROR_NOT_SUPPORTED if this query is not supported by the device
- NVML_ERROR_GPU_IS_LOST if the target GPU has fallen off the bus or is otherwise inaccessible
- NVML_ERROR_UNKNOWN on any unexpected error

6.11.2.6 nvmlReturn_t DECLDIR nvmlDeviceGetBoardId (nvmlDevice_t *device*, unsigned int * *boardId*)

Retrieves the device boardId from 0-N. Devices with the same boardId indicate GPUs connected to the same PLX. Use in conjunction with nvmlDeviceGetMultiGpuBoard() to decide if they are on the same board as well. The boardId returned is a unique ID for the current configuration. Uniqueness and ordering across reboots and system configurations is not guaranteed (i.e. if a Tesla K40c returns 0x100 and the two GPUs on a Tesla K10 in the same system returns 0x200 it is not guaranteed they will always return those values but they will always be different from each other).

For Fermi ™or newer fully supported devices.

Parameters:

device The identifier of the target device

boardId Reference in which to return the device's board ID

Returns:

- NVML_SUCCESS if *boardId* has been set
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *device* is invalid or *boardId* is NULL
- NVML_ERROR_NOT_SUPPORTED if the device does not support this feature
- NVML_ERROR_GPU_IS_LOST if the target GPU has fallen off the bus or is otherwise inaccessible
- NVML_ERROR_UNKNOWN on any unexpected error

6.11.2.7 nvmlReturn_t DECLDIR nvmlDeviceGetBoardPartNumber (nvmlDevice_t *device*, char * *partNumber*, unsigned int *length*)

Retrieves the the device board part number which is programmed into the board's InfoROM

For all products.

Parameters:

device Identifier of the target device

partNumber Reference to the buffer to return

length Length of the buffer reference

Returns:

- NVML_SUCCESS if *partNumber* has been set

- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_NOT_SUPPORTED if the needed VBIOS fields have not been filled
- NVML_ERROR_INVALID_ARGUMENT if *device* is invalid or *serial* is NULL
- NVML_ERROR_GPU_IS_LOST if the target GPU has fallen off the bus or is otherwise inaccessible
- NVML_ERROR_UNKNOWN on any unexpected error

6.11.2.8 nvmlReturn_t DECLDIR nvmlDeviceGetBrand (nvmlDevice_t *device*, nvmlBrandType_t * *type*)

Retrieves the brand of this device.

For all products.

The type is a member of nvmlBrandType_t defined above.

Parameters:

device The identifier of the target device

type Reference in which to return the product brand type

Returns:

- NVML_SUCCESS if *name* has been set
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *device* is invalid, or *type* is NULL
- NVML_ERROR_GPU_IS_LOST if the target GPU has fallen off the bus or is otherwise inaccessible
- NVML_ERROR_UNKNOWN on any unexpected error

6.11.2.9 nvmlReturn_t DECLDIR nvmlDeviceGetBridgeChipInfo (nvmlDevice_t *device*, nvmlBridgeChipHierarchy_t * *bridgeHierarchy*)

Get Bridge Chip Information for all the bridge chips on the board.

For all fully supported products. Only applicable to multi-GPU products.

Parameters:

device The identifier of the target device

bridgeHierarchy Reference to the returned bridge chip Hierarchy

Returns:

- NVML_SUCCESS if bridge chip exists
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *device* is invalid, or *bridgeInfo* is NULL
- NVML_ERROR_NOT_SUPPORTED if bridge chip not supported on the device
- NVML_ERROR_GPU_IS_LOST if the target GPU has fallen off the bus or is otherwise inaccessible
- NVML_ERROR_UNKNOWN on any unexpected error

6.11.2.10 nvmlReturn_t DECLDIR nvmlDeviceGetClock (nvmlDevice_t *device*, nvmlClockType_t *clockType*, nvmlClockId_t *clockId*, unsigned int * *clockMHz*)

Retrieves the clock speed for the clock specified by the clock type and clock ID.

For Kepler ™or newer fully supported devices.

Parameters:

device The identifier of the target device

clockType Identify which clock domain to query

clockId Identify which clock in the domain to query

clockMHz Reference in which to return the clock in MHz

Returns:

- NVML_SUCCESS if *clockMHz* has been set
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *device* is invalid or *clockMHz* is NULL or *clockType* is invalid
- NVML_ERROR_NOT_SUPPORTED if the device does not support this feature
- NVML_ERROR_GPU_IS_LOST if the target GPU has fallen off the bus or is otherwise inaccessible
- NVML_ERROR_UNKNOWN on any unexpected error

6.11.2.11 nvmlReturn_t DECLDIR nvmlDeviceGetClockInfo (nvmlDevice_t *device*, nvmlClockType_t *type*, unsigned int * *clock*)

Retrieves the current clock speeds for the device.

For Fermi ™or newer fully supported devices.

See nvmlClockType_t for details on available clock information.

Parameters:

device The identifier of the target device

type Identify which clock domain to query

clock Reference in which to return the clock speed in MHz

Returns:

- NVML_SUCCESS if *clock* has been set
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *device* is invalid or *clock* is NULL
- NVML_ERROR_NOT_SUPPORTED if the device cannot report the specified clock
- NVML_ERROR_GPU_IS_LOST if the target GPU has fallen off the bus or is otherwise inaccessible
- NVML_ERROR_UNKNOWN on any unexpected error

6.11.2.12 nvmlReturn_t DECLDIR nvmlDeviceGetComputeMode (nvmlDevice_t *device*, nvmlComputeMode_t * *mode*)

Retrieves the current compute mode for the device.

For all products.

See nvmlComputeMode_t for details on allowed compute modes.

Parameters:

device The identifier of the target device

mode Reference in which to return the current compute mode

Returns:

- NVML_SUCCESS if *mode* has been set
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *device* is invalid or *mode* is NULL
- NVML_ERROR_NOT_SUPPORTED if the device does not support this feature
- NVML_ERROR_GPU_IS_LOST if the target GPU has fallen off the bus or is otherwise inaccessible
- NVML_ERROR_UNKNOWN on any unexpected error

See also:

nvmlDeviceSetComputeMode()

6.11.2.13 nvmlReturn_t DECLDIR nvmlDeviceGetComputeRunningProcesses (nvmlDevice_t *device*, unsigned int * *infoCount*, nvmlProcessInfo_t * *infos*)

Get information about processes with a compute context on a device

For Fermi ™or newer fully supported devices.

This function returns information only about compute running processes (e.g. CUDA application which have active context). Any graphics applications (e.g. using OpenGL, DirectX) won't be listed by this function.

To query the current number of running compute processes, call this function with *infoCount = 0. The return code will be NVML_ERROR_INSUFFICIENT_SIZE, or NVML_SUCCESS if none are running. For this call *infos* is allowed to be NULL.

The usedGpuMemory field returned is all of the memory used by the application.

Keep in mind that information returned by this call is dynamic and the number of elements might change in time. Allocate more space for *infos* table in case new compute processes are spawned.

Parameters:

device The identifier of the target device

infoCount Reference in which to provide the *infos* array size, and to return the number of returned elements

infos Reference in which to return the process information

Returns:

- NVML_SUCCESS if *infoCount* and *infos* have been populated

- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INSUFFICIENT_SIZE if *infoCount* indicates that the *infos* array is too small *infoCount* will contain minimal amount of space necessary for the call to complete
- NVML_ERROR_INVALID_ARGUMENT if *device* is invalid, either of *infoCount* or *infos* is NULL
- NVML_ERROR_GPU_IS_LOST if the target GPU has fallen off the bus or is otherwise inaccessible
- NVML_ERROR_UNKNOWN on any unexpected error

See also:

nvmlSystemGetProcessName

6.11.2.14 nvmlReturn_t DECLDIR nvmlDeviceGetCount (unsigned int * *deviceCount*)

Retrieves the number of compute devices in the system. A compute device is a single GPU.

For all products.

Note: New nvmlDeviceGetCount_v2 (default in NVML 5.319) returns count of all devices in the system even if nvmlDeviceGetHandleByIndex_v2 returns NVML_ERROR_NO_PERMISSION for such device. Update your code to handle this error, or use NVML 4.304 or older nvml header file. For backward binary compatibility reasons _v1 version of the API is still present in the shared library. Old _v1 version of nvmlDeviceGetCount doesn't count devices that NVML has no permission to talk to.

Parameters:

deviceCount Reference in which to return the number of accessible devices

Returns:

- NVML_SUCCESS if *deviceCount* has been set
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *deviceCount* is NULL
- NVML_ERROR_UNKNOWN on any unexpected error

6.11.2.15 nvmlReturn_t DECLDIR nvmlDeviceGetCpuAffinity (nvmlDevice_t *device*, unsigned int *cpuSetSize*, unsigned long * *cpuSet*)

Retrieves an array of unsigned ints (sized to cpuSetSize) of bitmasks with the ideal CPU affinity for the device For example, if processors 0, 1, 32, and 33 are ideal for the device and cpuSetSize == 2, result[0] = 0x3, result[1] = 0x3

For Kepler ™or newer fully supported devices. Supported on Linux only.

Parameters:

device The identifier of the target device

cpuSetSize The size of the cpuSet array that is safe to access

cpuSet Array reference in which to return a bitmask of CPUs, 64 CPUs per unsigned long on 64-bit machines, 32 on 32-bit machines

Returns:

- NVML_SUCCESS if *cpuAffinity* has been filled

- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *device* is invalid, cpuSetSize == 0, or cpuSet is NULL
- NVML_ERROR_NOT_SUPPORTED if the device does not support this feature
- NVML_ERROR_GPU_IS_LOST if the target GPU has fallen off the bus or is otherwise inaccessible
- NVML_ERROR_UNKNOWN on any unexpected error

6.11.2.16 nvmlReturn_t DECLDIR nvmlDeviceGetCurrentClocksThrottleReasons (nvmlDevice_t *device*, unsigned long long * *clocksThrottleReasons*)

Retrieves current clocks throttling reasons.

For all fully supported products.

Note:

More than one bit can be enabled at the same time. Multiple reasons can be affecting clocks at once.

Parameters:

device The identifier of the target device

clocksThrottleReasons Reference in which to return bitmask of active clocks throttle reasons

Returns:

- NVML_SUCCESS if *clocksThrottleReasons* has been set
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *device* is invalid or *clocksThrottleReasons* is NULL
- NVML_ERROR_NOT_SUPPORTED if the device does not support this feature
- NVML_ERROR_GPU_IS_LOST if the target GPU has fallen off the bus or is otherwise inaccessible
- NVML_ERROR_UNKNOWN on any unexpected error

See also:

NvmlClocksThrottleReasons
nvmlDeviceGetSupportedClocksThrottleReasons

6.11.2.17 nvmlReturn_t DECLDIR nvmlDeviceGetCurrPcieLinkGeneration (nvmlDevice_t *device*, unsigned int * *currLinkGen*)

Retrieves the current PCIe link generation

For Fermi ™or newer fully supported devices.

Parameters:

device The identifier of the target device

currLinkGen Reference in which to return the current PCIe link generation

Returns:

- NVML_SUCCESS if *currLinkGen* has been populated

- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *device* is invalid or *currLinkGen* is null
- NVML_ERROR_NOT_SUPPORTED if PCIe link information is not available
- NVML_ERROR_GPU_IS_LOST if the target GPU has fallen off the bus or is otherwise inaccessible
- NVML_ERROR_UNKNOWN on any unexpected error

6.11.2.18 nvmlReturn_t DECLDIR nvmlDeviceGetCurrPcieLinkWidth (nvmlDevice_t *device*, unsigned int * *currLinkWidth*)

Retrieves the current PCIe link width

For Fermi ™or newer fully supported devices.

Parameters:

device The identifier of the target device

currLinkWidth Reference in which to return the current PCIe link generation

Returns:

- NVML_SUCCESS if *currLinkWidth* has been populated
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *device* is invalid or *currLinkWidth* is null
- NVML_ERROR_NOT_SUPPORTED if PCIe link information is not available
- NVML_ERROR_GPU_IS_LOST if the target GPU has fallen off the bus or is otherwise inaccessible
- NVML_ERROR_UNKNOWN on any unexpected error

6.11.2.19 nvmlReturn_t DECLDIR nvmlDeviceGetDecoderUtilization (nvmlDevice_t *device*, unsigned int * *utilization*, unsigned int * *samplingPeriodUs*)

Retrieves the current utilization and sampling size in microseconds for the Decoder

For Kepler ™or newer fully supported devices.

Parameters:

device The identifier of the target device

utilization Reference to an unsigned int for decoder utilization info

samplingPeriodUs Reference to an unsigned int for the sampling period in US

Returns:

- NVML_SUCCESS if *utilization* has been populated
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *device* is invalid, *utilization* is NULL, or *samplingPeriodUs* is NULL
- NVML_ERROR_NOT_SUPPORTED if the device does not support this feature
- NVML_ERROR_GPU_IS_LOST if the target GPU has fallen off the bus or is otherwise inaccessible
- NVML_ERROR_UNKNOWN on any unexpected error

6.11.2.20 nvmlReturn_t DECLDIR nvmlDeviceGetDefaultApplicationsClock (nvmlDevice_t *device*, nvmlClockType_t *clockType*, unsigned int * *clockMHz*)

Retrieves the default applications clock that GPU boots with or defaults to after nvmlDeviceResetApplicationsClocks call.

For Kepler ™or newer fully supported devices.

Parameters:

device The identifier of the target device

clockType Identify which clock domain to query

clockMHz Reference in which to return the default clock in MHz

Returns:

- NVML_SUCCESS if *clockMHz* has been set
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *device* is invalid or *clockMHz* is NULL or *clockType* is invalid
- NVML_ERROR_NOT_SUPPORTED if the device does not support this feature
- NVML_ERROR_GPU_IS_LOST if the target GPU has fallen off the bus or is otherwise inaccessible
- NVML_ERROR_UNKNOWN on any unexpected error

See also:

nvmlDeviceGetApplicationsClock

6.11.2.21 nvmlReturn_t DECLDIR nvmlDeviceGetDetailedEccErrors (nvmlDevice_t *device*, nvmlMemoryErrorType_t *errorType*, nvmlEccCounterType_t *counterType*, nvmlEccErrorCounts_t * *eccCounts*)

Retrieves the detailed ECC error counts for the device.

Deprecated

This API supports only a fixed set of ECC error locations On different GPU architectures different locations are supported See nvmlDeviceGetMemoryErrorCounter

For Fermi ™or newer fully supported devices. Only applicable to devices with ECC. Requires *NVML_INFOROM_ECC* version 2.0 or higher to report aggregate location-based ECC counts. Requires *NVML_INFOROM_ECC* version 1.0 or higher to report all other ECC counts. Requires ECC Mode to be enabled.

Detailed errors provide separate ECC counts for specific parts of the memory system.

Reports zero for unsupported ECC error counters when a subset of ECC error counters are supported.

See nvmlMemoryErrorType_t for a description of available bit types.

See nvmlEccCounterType_t for a description of available counter types.

See nvmlEccErrorCounts_t for a description of provided detailed ECC counts.

Parameters:

device The identifier of the target device

errorType Flag that specifies the type of the errors.

counterType Flag that specifies the counter-type of the errors.

eccCounts Reference in which to return the specified ECC errors

Returns:

- NVML_SUCCESS if *eccCounts* has been populated
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *device*, *errorType* or *counterType* is invalid, or *eccCounts* is NULL
- NVML_ERROR_NOT_SUPPORTED if the device does not support this feature
- NVML_ERROR_GPU_IS_LOST if the target GPU has fallen off the bus or is otherwise inaccessible
- NVML_ERROR_UNKNOWN on any unexpected error

See also:

nvmlDeviceClearEccErrorCounts()

6.11.2.22 nvmlReturn_t DECLDIR nvmlDeviceGetDisplayActive (nvmlDevice_t *device*, nvmlEnableState_t * *isActive*)

Retrieves the display active state for the device.

For all products.

This method indicates whether a display is initialized on the device. For example whether X Server is attached to this device and has allocated memory for the screen.

Display can be active even when no monitor is physically attached.

See nvmlEnableState_t for details on allowed modes.

Parameters:

device The identifier of the target device

isActive Reference in which to return the display active state

Returns:

- NVML_SUCCESS if *isActive* has been set
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *device* is invalid or *isActive* is NULL
- NVML_ERROR_NOT_SUPPORTED if the device does not support this feature
- NVML_ERROR_GPU_IS_LOST if the target GPU has fallen off the bus or is otherwise inaccessible
- NVML_ERROR_UNKNOWN on any unexpected error

6.11.2.23 nvmlReturn_t DECLDIR nvmlDeviceGetDisplayMode (nvmlDevice_t *device*, nvmlEnableState_t * *display*)

Retrieves the display mode for the device.

For all products.

This method indicates whether a physical display (e.g. monitor) is currently connected to any of the device's connectors.

See nvmlEnableState_t for details on allowed modes.

Parameters:

device The identifier of the target device

display Reference in which to return the display mode

Returns:

- NVML_SUCCESS if *display* has been set
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *device* is invalid or *display* is NULL
- NVML_ERROR_NOT_SUPPORTED if the device does not support this feature
- NVML_ERROR_GPU_IS_LOST if the target GPU has fallen off the bus or is otherwise inaccessible
- NVML_ERROR_UNKNOWN on any unexpected error

6.11.2.24 nvmlReturn_t DECLDIR nvmlDeviceGetDriverModel (nvmlDevice_t *device*, nvmlDriverModel_t * *current*, nvmlDriverModel_t * *pending*)

Retrieves the current and pending driver model for the device.

For Fermi ™or newer fully supported devices. For windows only.

On Windows platforms the device driver can run in either WDDM or WDM (TCC) mode. If a display is attached to the device it must run in WDDM mode. TCC mode is preferred if a display is not attached.

See nvmlDriverModel_t for details on available driver models.

Parameters:

device The identifier of the target device

current Reference in which to return the current driver model

pending Reference in which to return the pending driver model

Returns:

- NVML_SUCCESS if either *current* and/or *pending* have been set
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *device* is invalid or both *current* and *pending* are NULL
- NVML_ERROR_NOT_SUPPORTED if the platform is not windows
- NVML_ERROR_GPU_IS_LOST if the target GPU has fallen off the bus or is otherwise inaccessible
- NVML_ERROR_UNKNOWN on any unexpected error

See also:

nvmlDeviceSetDriverModel()

6.11.2.25 nvmlReturn_t DECLDIR nvmlDeviceGetEccMode (nvmlDevice_t *device*, nvmlEnableState_t * *current*, nvmlEnableState_t * *pending*)

Retrieves the current and pending ECC modes for the device.

For Fermi ™or newer fully supported devices. Only applicable to devices with ECC. Requires *NVML_INFOROM_-ECC* version 1.0 or higher.

Changing ECC modes requires a reboot. The "pending" ECC mode refers to the target mode following the next reboot.

See nvmlEnableState_t for details on allowed modes.

Parameters:

device The identifier of the target device

current Reference in which to return the current ECC mode

pending Reference in which to return the pending ECC mode

Returns:

- NVML_SUCCESS if *current* and *pending* have been set
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *device* is invalid or either *current* or *pending* is NULL
- NVML_ERROR_NOT_SUPPORTED if the device does not support this feature
- NVML_ERROR_GPU_IS_LOST if the target GPU has fallen off the bus or is otherwise inaccessible
- NVML_ERROR_UNKNOWN on any unexpected error

See also:

nvmlDeviceSetEccMode()

6.11.2.26 nvmlReturn_t DECLDIR nvmlDeviceGetEncoderUtilization (nvmlDevice_t *device*, unsigned int * *utilization*, unsigned int * *samplingPeriodUs*)

Retrieves the current utilization and sampling size in microseconds for the Encoder

For Kepler ™or newer fully supported devices.

Parameters:

device The identifier of the target device

utilization Reference to an unsigned int for encoder utilization info

samplingPeriodUs Reference to an unsigned int for the sampling period in US

Returns:

- NVML_SUCCESS if *utilization* has been populated
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *device* is invalid, *utilization* is NULL, or *samplingPeriodUs* is NULL
- NVML_ERROR_NOT_SUPPORTED if the device does not support this feature
- NVML_ERROR_GPU_IS_LOST if the target GPU has fallen off the bus or is otherwise inaccessible
- NVML_ERROR_UNKNOWN on any unexpected error

6.11.2.27 nvmlReturn_t DECLDIR nvmlDeviceGetEnforcedPowerLimit (nvmlDevice_t *device*, unsigned int * *limit*)

Get the effective power limit that the driver enforces after taking into account all limiters

Note: This can be different from the nvmlDeviceGetPowerManagementLimit if other limits are set elsewhere This includes the out of band power limit interface

For Kepler ™or newer fully supported devices.

Parameters:

device The device to communicate with

limit Reference in which to return the power management limit in milliwatts

Returns:

- NVML_SUCCESS if *limit* has been set
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *device* is invalid or *limit* is NULL
- NVML_ERROR_NOT_SUPPORTED if the device does not support this feature
- NVML_ERROR_GPU_IS_LOST if the target GPU has fallen off the bus or is otherwise inaccessible
- NVML_ERROR_UNKNOWN on any unexpected error

6.11.2.28 nvmlReturn_t DECLDIR nvmlDeviceGetFanSpeed (nvmlDevice_t *device*, unsigned int * *speed*)

Retrieves the intended operating speed of the device's fan.

Note: The reported speed is the intended fan speed. If the fan is physically blocked and unable to spin, the output will not match the actual fan speed.

For all discrete products with dedicated fans.

The fan speed is expressed as a percent of the maximum, i.e. full speed is 100%.

Parameters:

device The identifier of the target device

speed Reference in which to return the fan speed percentage

Returns:

- NVML_SUCCESS if *speed* has been set
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *device* is invalid or *speed* is NULL
- NVML_ERROR_NOT_SUPPORTED if the device does not have a fan
- NVML_ERROR_GPU_IS_LOST if the target GPU has fallen off the bus or is otherwise inaccessible
- NVML_ERROR_UNKNOWN on any unexpected error

6.11.2.29 nvmlReturn_t DECLDIR nvmlDeviceGetGpuOperationMode (nvmlDevice_t *device*, nvmlGpuOperationMode_t * *current*, nvmlGpuOperationMode_t * *pending*)

Retrieves the current GOM and pending GOM (the one that GPU will switch to after reboot).

For GK110 M-class and X-class Tesla ™products from the Kepler family. Modes NVML_GOM_LOW_DP and NVML_GOM_ALL_ON are supported on fully supported GeForce products. Not supported on Quadro ®and Tesla ™C-class products.

Parameters:

device The identifier of the target device

current Reference in which to return the current GOM

pending Reference in which to return the pending GOM

Returns:

- NVML_SUCCESS if *mode* has been populated
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *device* is invalid or *current* or *pending* is NULL
- NVML_ERROR_NOT_SUPPORTED if the device does not support this feature
- NVML_ERROR_GPU_IS_LOST if the target GPU has fallen off the bus or is otherwise inaccessible
- NVML_ERROR_UNKNOWN on any unexpected error

See also:

nvmlGpuOperationMode_t
nvmlDeviceSetGpuOperationMode

6.11.2.30 nvmlReturn_t DECLDIR nvmlDeviceGetGraphicsRunningProcesses (nvmlDevice_t *device*, unsigned int * *infoCount*, nvmlProcessInfo_t * *infos*)

Get information about processes with a graphics context on a device

For Kepler ™or newer fully supported devices.

This function returns information only about graphics based processes (eg. applications using OpenGL, DirectX)

To query the current number of running graphics processes, call this function with *infoCount = 0. The return code will be NVML_ERROR_INSUFFICIENT_SIZE, or NVML_SUCCESS if none are running. For this call *infos* is allowed to be NULL.

The usedGpuMemory field returned is all of the memory used by the application.

Keep in mind that information returned by this call is dynamic and the number of elements might change in time. Allocate more space for *infos* table in case new graphics processes are spawned.

Parameters:

device The identifier of the target device

infoCount Reference in which to provide the *infos* array size, and to return the number of returned elements

infos Reference in which to return the process information

Returns:

- NVML_SUCCESS if *infoCount* and *infos* have been populated

- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INSUFFICIENT_SIZE if *infoCount* indicates that the *infos* array is too small *infoCount* will contain minimal amount of space necessary for the call to complete
- NVML_ERROR_INVALID_ARGUMENT if *device* is invalid, either of *infoCount* or *infos* is NULL
- NVML_ERROR_GPU_IS_LOST if the target GPU has fallen off the bus or is otherwise inaccessible
- NVML_ERROR_UNKNOWN on any unexpected error

See also:

nvmlSystemGetProcessName

6.11.2.31 nvmlReturn_t DECLDIR nvmlDeviceGetHandleByIndex (unsigned int *index*, nvmlDevice_t * *device*)

Acquire the handle for a particular device, based on its index.

For all products.

Valid indices are derived from the *accessibleDevices* count returned by nvmlDeviceGetCount(). For example, if *accessibleDevices* is 2 the valid indices are 0 and 1, corresponding to GPU 0 and GPU 1.

The order in which NVML enumerates devices has no guarantees of consistency between reboots. For that reason it is recommended that devices be looked up by their PCI ids or UUID. See nvmlDeviceGetHandleByUUID() and nvmlDeviceGetHandleByPciBusId().

Note: The NVML index may not correlate with other APIs, such as the CUDA device index.

Starting from NVML 5, this API causes NVML to initialize the target GPU NVML may initialize additional GPUs if:

- The target GPU is an SLI slave

Note: New nvmlDeviceGetCount_v2 (default in NVML 5.319) returns count of all devices in the system even if nvmlDeviceGetHandleByIndex_v2 returns NVML_ERROR_NO_PERMISSION for such device. Update your code to handle this error, or use NVML 4.304 or older nvml header file. For backward binary compatibility reasons _v1 version of the API is still present in the shared library. Old _v1 version of nvmlDeviceGetCount doesn't count devices that NVML has no permission to talk to.

This means that nvmlDeviceGetHandleByIndex_v2 and _v1 can return different devices for the same index. If you don't touch macros that map old (_v1) versions to _v2 versions at the top of the file you don't need to worry about that.

Parameters:

index The index of the target GPU, >= 0 and < *accessibleDevices*

device Reference in which to return the device handle

Returns:

- NVML_SUCCESS if *device* has been set
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *index* is invalid or *device* is NULL
- NVML_ERROR_INSUFFICIENT_POWER if any attached devices have improperly attached external power cables
- NVML_ERROR_NO_PERMISSION if the user doesn't have permission to talk to this device

- NVML_ERROR_IRQ_ISSUE if NVIDIA kernel detected an interrupt issue with the attached GPUs
- NVML_ERROR_GPU_IS_LOST if the target GPU has fallen off the bus or is otherwise inaccessible
- NVML_ERROR_UNKNOWN on any unexpected error

See also:

nvmlDeviceGetIndex
nvmlDeviceGetCount

6.11.2.32 nvmlReturn_t DECLDIR nvmlDeviceGetHandleByPciBusId (const char * *pciBusId*, nvmlDevice_t * *device*)

Acquire the handle for a particular device, based on its PCI bus id.

For all products.

This value corresponds to the nvmlPciInfo_t::busId returned by nvmlDeviceGetPciInfo().

Starting from NVML 5, this API causes NVML to initialize the target GPU NVML may initialize additional GPUs if:

- The target GPU is an SLI slave

Note:

NVML 4.304 and older version of nvmlDeviceGetHandleByPciBusId"_v1" returns NVML_ERROR_NOT_FOUND instead of NVML_ERROR_NO_PERMISSION.

Parameters:

pciBusId The PCI bus id of the target GPU

device Reference in which to return the device handle

Returns:

- NVML_SUCCESS if *device* has been set
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *pciBusId* is invalid or *device* is NULL
- NVML_ERROR_NOT_FOUND if *pciBusId* does not match a valid device on the system
- NVML_ERROR_INSUFFICIENT_POWER if the attached device has improperly attached external power cables
- NVML_ERROR_NO_PERMISSION if the user doesn't have permission to talk to this device
- NVML_ERROR_IRQ_ISSUE if NVIDIA kernel detected an interrupt issue with the attached GPUs
- NVML_ERROR_GPU_IS_LOST if the target GPU has fallen off the bus or is otherwise inaccessible
- NVML_ERROR_UNKNOWN on any unexpected error

6.11.2.33 nvmlReturn_t DECLDIR nvmlDeviceGetHandleBySerial (const char * *serial*, nvmlDevice_t * *device*)

Acquire the handle for a particular device, based on its board serial number.

For Fermi ™or newer fully supported devices.

This number corresponds to the value printed directly on the board, and to the value returned by nvmlDeviceGetSerial().

Deprecated

Since more than one GPU can exist on a single board this function is deprecated in favor of nvmlDeviceGetHandleByUUID. For dual GPU boards this function will return NVML_ERROR_INVALID_ARGUMENT.

Starting from NVML 5, this API causes NVML to initialize the target GPU NVML may initialize additional GPUs as it searches for the target GPU

Parameters:

serial The board serial number of the target GPU

device Reference in which to return the device handle

Returns:

- NVML_SUCCESS if *device* has been set
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *serial* is invalid, *device* is NULL or more than one device has the same serial (dual GPU boards)
- NVML_ERROR_NOT_FOUND if *serial* does not match a valid device on the system
- NVML_ERROR_INSUFFICIENT_POWER if any attached devices have improperly attached external power cables
- NVML_ERROR_IRQ_ISSUE if NVIDIA kernel detected an interrupt issue with the attached GPUs
- NVML_ERROR_GPU_IS_LOST if any GPU has fallen off the bus or is otherwise inaccessible
- NVML_ERROR_UNKNOWN on any unexpected error

See also:

nvmlDeviceGetSerial
nvmlDeviceGetHandleByUUID

6.11.2.34 nvmlReturn_t DECLDIR nvmlDeviceGetHandleByUUID (const char * *uuid*, nvmlDevice_t * *device*)

Acquire the handle for a particular device, based on its globally unique immutable UUID associated with each device.

For all products.

Parameters:

uuid The UUID of the target GPU

device Reference in which to return the device handle

Starting from NVML 5, this API causes NVML to initialize the target GPU NVML may initialize additional GPUs as it searches for the target GPU

Returns:

- NVML_SUCCESS if *device* has been set
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *uuid* is invalid or *device* is null
- NVML_ERROR_NOT_FOUND if *uuid* does not match a valid device on the system

- NVML_ERROR_INSUFFICIENT_POWER if any attached devices have improperly attached external power cables
- NVML_ERROR_IRQ_ISSUE if NVIDIA kernel detected an interrupt issue with the attached GPUs
- NVML_ERROR_GPU_IS_LOST if any GPU has fallen off the bus or is otherwise inaccessible
- NVML_ERROR_UNKNOWN on any unexpected error

See also:

nvmlDeviceGetUUID

6.11.2.35 nvmlReturn_t DECLDIR nvmlDeviceGetIndex (nvmlDevice_t *device*, unsigned int * *index*)

Retrieves the NVML index of this device.

For all products.

Valid indices are derived from the *accessibleDevices* count returned by nvmlDeviceGetCount(). For example, if *accessibleDevices* is 2 the valid indices are 0 and 1, corresponding to GPU 0 and GPU 1.

The order in which NVML enumerates devices has no guarantees of consistency between reboots. For that reason it is recommended that devices be looked up by their PCI ids or GPU UUID. See nvmlDeviceGetHandleByPciBusId() and nvmlDeviceGetHandleByUUID().

Note: The NVML index may not correlate with other APIs, such as the CUDA device index.

Parameters:

device The identifier of the target device

index Reference in which to return the NVML index of the device

Returns:

- NVML_SUCCESS if *index* has been set
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *device* is invalid, or *index* is NULL
- NVML_ERROR_GPU_IS_LOST if the target GPU has fallen off the bus or is otherwise inaccessible
- NVML_ERROR_UNKNOWN on any unexpected error

See also:

nvmlDeviceGetHandleByIndex()
nvmlDeviceGetCount()

6.11.2.36 nvmlReturn_t DECLDIR nvmlDeviceGetInforomConfigurationChecksum (nvmlDevice_t *device*, unsigned int * *checksum*)

Retrieves the checksum of the configuration stored in the device's infoROM.

For all products with an inforom.

Can be used to make sure that two GPUs have the exact same configuration. Current checksum takes into account configuration stored in PWR and ECC infoROM objects. Checksum can change between driver releases or when user changes configuration (e.g. disable/enable ECC)

Parameters:

device The identifier of the target device

checksum Reference in which to return the infoROM configuration checksum

Returns:

- NVML_SUCCESS if *checksum* has been set
- NVML_ERROR_CORRUPTED_INFOROM if the device's checksum couldn't be retrieved due to infoROM corruption
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *checksum* is NULL
- NVML_ERROR_NOT_SUPPORTED if the device does not support this feature
- NVML_ERROR_GPU_IS_LOST if the target GPU has fallen off the bus or is otherwise inaccessible
- NVML_ERROR_UNKNOWN on any unexpected error

6.11.2.37 nvmlReturn_t DECLDIR nvmlDeviceGetInforomImageVersion (nvmlDevice_t *device*, char * *version*, unsigned int *length*)

Retrieves the global infoROM image version

For all products with an inforom.

Image version just like VBIOS version uniquely describes the exact version of the infoROM flashed on the board in contrast to infoROM object version which is only an indicator of supported features. Version string will not exceed 16 characters in length (including the NULL terminator). See nvmlConstants::NVML_DEVICE_INFOROM_VERSION_BUFFER_SIZE.

Parameters:

device The identifier of the target device

version Reference in which to return the infoROM image version

length The maximum allowed length of the string returned in *version*

Returns:

- NVML_SUCCESS if *version* has been set
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *version* is NULL
- NVML_ERROR_INSUFFICIENT_SIZE if *length* is too small
- NVML_ERROR_NOT_SUPPORTED if the device does not have an infoROM
- NVML_ERROR_GPU_IS_LOST if the target GPU has fallen off the bus or is otherwise inaccessible
- NVML_ERROR_UNKNOWN on any unexpected error

See also:

nvmlDeviceGetInforomVersion

6.11.2.38 nvmlReturn_t DECLDIR nvmlDeviceGetInforomVersion (nvmlDevice_t *device*, nvmlInforomObject_t *object*, char * *version*, unsigned int *length*)

Retrieves the version information for the device's infoROM object.

For all products with an inforom.

Fermi and higher parts have non-volatile on-board memory for persisting device info, such as aggregate ECC counts. The version of the data structures in this memory may change from time to time. It will not exceed 16 characters in length (including the NULL terminator). See nvmlConstants::NVML_DEVICE_INFOROM_VERSION_BUFFER_SIZE.

See nvmlInforomObject_t for details on the available infoROM objects.

Parameters:

device The identifier of the target device

object The target infoROM object

version Reference in which to return the infoROM version

length The maximum allowed length of the string returned in *version*

Returns:

- NVML_SUCCESS if *version* has been set
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *version* is NULL
- NVML_ERROR_INSUFFICIENT_SIZE if *length* is too small
- NVML_ERROR_NOT_SUPPORTED if the device does not have an infoROM
- NVML_ERROR_GPU_IS_LOST if the target GPU has fallen off the bus or is otherwise inaccessible
- NVML_ERROR_UNKNOWN on any unexpected error

See also:

nvmlDeviceGetInforomImageVersion

6.11.2.39 nvmlReturn_t DECLDIR nvmlDeviceGetMaxClockInfo (nvmlDevice_t *device*, nvmlClockType_t *type*, unsigned int * *clock*)

Retrieves the maximum clock speeds for the device.

For Fermi ™or newer fully supported devices.

See nvmlClockType_t for details on available clock information.

Note:

On GPUs from Fermi family current P0 clocks (reported by nvmlDeviceGetClockInfo) can differ from max clocks by few MHz.

Parameters:

device The identifier of the target device

type Identify which clock domain to query

clock Reference in which to return the clock speed in MHz

Returns:

- NVML_SUCCESS if *clock* has been set
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *device* is invalid or *clock* is NULL
- NVML_ERROR_NOT_SUPPORTED if the device cannot report the specified clock
- NVML_ERROR_GPU_IS_LOST if the target GPU has fallen off the bus or is otherwise inaccessible
- NVML_ERROR_UNKNOWN on any unexpected error

6.11.2.40 nvmlReturn_t DECLDIR nvmlDeviceGetMaxCustomerBoostClock (nvmlDevice_t *device*, nvmlClockType_t *clockType*, unsigned int * *clockMHz*)

Retrieves the customer defined maximum boost clock speed specified by the given clock type.

For newer than Maxwell ™fully supported devices.

Parameters:

device The identifier of the target device

clockType Identify which clock domain to query

clockMHz Reference in which to return the clock in MHz

Returns:

- NVML_SUCCESS if *clockMHz* has been set
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *device* is invalid or *clockMHz* is NULL or *clockType* is invalid
- NVML_ERROR_NOT_SUPPORTED if the device or the *clockType* on this device does not support this feature
- NVML_ERROR_GPU_IS_LOST if the target GPU has fallen off the bus or is otherwise inaccessible
- NVML_ERROR_UNKNOWN on any unexpected error

6.11.2.41 nvmlReturn_t DECLDIR nvmlDeviceGetMaxPcieLinkGeneration (nvmlDevice_t *device*, unsigned int * *maxLinkGen*)

Retrieves the maximum PCIe link generation possible with this device and system

I.E. for a generation 2 PCIe device attached to a generation 1 PCIe bus the max link generation this function will report is generation 1.

For Fermi ™or newer fully supported devices.

Parameters:

device The identifier of the target device

maxLinkGen Reference in which to return the max PCIe link generation

Returns:

- NVML_SUCCESS if *maxLinkGen* has been populated
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized

- NVML_ERROR_INVALID_ARGUMENT if *device* is invalid or *maxLinkGen* is null
- NVML_ERROR_NOT_SUPPORTED if PCIe link information is not available
- NVML_ERROR_GPU_IS_LOST if the target GPU has fallen off the bus or is otherwise inaccessible
- NVML_ERROR_UNKNOWN on any unexpected error

6.11.2.42 nvmlReturn_t DECLDIR nvmlDeviceGetMaxPcieLinkWidth (nvmlDevice_t *device*, unsigned int * *maxLinkWidth*)

Retrieves the maximum PCIe link width possible with this device and system

I.E. for a device with a 16x PCIe bus width attached to a 8x PCIe system bus this function will report a max link width of 8.

For Fermi ™or newer fully supported devices.

Parameters:

device The identifier of the target device

maxLinkWidth Reference in which to return the max PCIe link generation

Returns:

- NVML_SUCCESS if *maxLinkWidth* has been populated
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *device* is invalid or *maxLinkWidth* is null
- NVML_ERROR_NOT_SUPPORTED if PCIe link information is not available
- NVML_ERROR_GPU_IS_LOST if the target GPU has fallen off the bus or is otherwise inaccessible
- NVML_ERROR_UNKNOWN on any unexpected error

6.11.2.43 nvmlReturn_t DECLDIR nvmlDeviceGetMemoryErrorCounter (nvmlDevice_t *device*, nvmlMemoryErrorType_t *errorType*, nvmlEccCounterType_t *counterType*, nvmlMemoryLocation_t *locationType*, unsigned long long * *count*)

Retrieves the requested memory error counter for the device.

For Fermi ™or newer fully supported devices. Requires *NVML_INFOROM_ECC* version 2.0 or higher to report aggregate location-based memory error counts. Requires *NVML_INFOROM_ECC* version 1.0 or higher to report all other memory error counts.

Only applicable to devices with ECC.

Requires ECC Mode to be enabled.

See nvmlMemoryErrorType_t for a description of available memory error types.

See nvmlEccCounterType_t for a description of available counter types.

See nvmlMemoryLocation_t for a description of available counter locations.

Parameters:

device The identifier of the target device

errorType Flag that specifies the type of error.

counterType Flag that specifies the counter-type of the errors.

locationType Specifies the location of the counter.

count Reference in which to return the ECC counter

Returns:

- NVML_SUCCESS if *count* has been populated
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *device*, *bitTyp*,e *counterType* or *locationType* is invalid, or *count* is NULL
- NVML_ERROR_NOT_SUPPORTED if the device does not support ECC error reporting in the specified memory
- NVML_ERROR_GPU_IS_LOST if the target GPU has fallen off the bus or is otherwise inaccessible
- NVML_ERROR_UNKNOWN on any unexpected error

6.11.2.44 nvmlReturn_t DECLDIR nvmlDeviceGetMemoryInfo (nvmlDevice_t *device*, nvmlMemory_t * *memory*)

Retrieves the amount of used, free and total memory available on the device, in bytes.

For all products.

Enabling ECC reduces the amount of total available memory, due to the extra required parity bits. Under WDDM most device memory is allocated and managed on startup by Windows.

Under Linux and Windows TCC, the reported amount of used memory is equal to the sum of memory allocated by all active channels on the device.

See nvmlMemory_t for details on available memory info.

Parameters:

device The identifier of the target device

memory Reference in which to return the memory information

Returns:

- NVML_SUCCESS if *memory* has been populated
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *device* is invalid or *memory* is NULL
- NVML_ERROR_GPU_IS_LOST if the target GPU has fallen off the bus or is otherwise inaccessible
- NVML_ERROR_UNKNOWN on any unexpected error

6.11.2.45 nvmlReturn_t DECLDIR nvmlDeviceGetMinorNumber (nvmlDevice_t *device*, unsigned int * *minorNumber*)

Retrieves minor number for the device. The minor number for the device is such that the Nvidia device node file for each GPU will have the form /dev/nvidia[minor number].

For all products. Supported only for Linux

Parameters:

device The identifier of the target device

minorNumber Reference in which to return the minor number for the device

Returns:

- NVML_SUCCESS if the minor number is successfully retrieved
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *device* is invalid or *minorNumber* is NULL
- NVML_ERROR_NOT_SUPPORTED if this query is not supported by the device
- NVML_ERROR_GPU_IS_LOST if the target GPU has fallen off the bus or is otherwise inaccessible
- NVML_ERROR_UNKNOWN on any unexpected error

6.11.2.46 nvmlReturn_t DECLDIR nvmlDeviceGetMultiGpuBoard (nvmlDevice_t *device*, unsigned int * *multiGpuBool*)

Retrieves whether the device is on a Multi-GPU Board Devices that are on multi-GPU boards will set *multiGpuBool* to a non-zero value.

For Fermi ™or newer fully supported devices.

Parameters:

device The identifier of the target device

multiGpuBool Reference in which to return a zero or non-zero value to indicate whether the device is on a multi GPU board

Returns:

- NVML_SUCCESS if *multiGpuBool* has been set
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *device* is invalid or *multiGpuBool* is NULL
- NVML_ERROR_NOT_SUPPORTED if the device does not support this feature
- NVML_ERROR_GPU_IS_LOST if the target GPU has fallen off the bus or is otherwise inaccessible
- NVML_ERROR_UNKNOWN on any unexpected error

6.11.2.47 nvmlReturn_t DECLDIR nvmlDeviceGetName (nvmlDevice_t *device*, char * *name*, unsigned int *length*)

Retrieves the name of this device.

For all products.

The name is an alphanumeric string that denotes a particular product, e.g. Tesla ™C2070. It will not exceed 64 characters in length (including the NULL terminator). See nvmlConstants::NVML_DEVICE_NAME_BUFFER_SIZE.

Parameters:

device The identifier of the target device

name Reference in which to return the product name

length The maximum allowed length of the string returned in *name*

Returns:

- NVML_SUCCESS if *name* has been set
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *device* is invalid, or *name* is NULL
- NVML_ERROR_INSUFFICIENT_SIZE if *length* is too small
- NVML_ERROR_GPU_IS_LOST if the target GPU has fallen off the bus or is otherwise inaccessible
- NVML_ERROR_UNKNOWN on any unexpected error

6.11.2.48 nvmlReturn_t DECLDIR nvmlDeviceGetPcieReplayCounter (nvmlDevice_t *device*, unsigned int * *value*)

Retrieve the PCIe replay counter.

For Kepler ™or newer fully supported devices.

Parameters:

device The identifier of the target device

value Reference in which to return the counter's value

Returns:

- NVML_SUCCESS if *value* and *rollover* have been set
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *device* is invalid, or *value* or *rollover* are NULL
- NVML_ERROR_NOT_SUPPORTED if the device does not support this feature
- NVML_ERROR_GPU_IS_LOST if the target GPU has fallen off the bus or is otherwise inaccessible
- NVML_ERROR_UNKNOWN on any unexpected error

6.11.2.49 nvmlReturn_t DECLDIR nvmlDeviceGetPcieThroughput (nvmlDevice_t *device*, nvmlPcieUtilCounter_t *counter*, unsigned int * *value*)

Retrieve PCIe utilization information. This function is querying a byte counter over a 20ms interval and thus is the PCIe throughput over that interval.

For Maxwell ™or newer fully supported devices.

This method is not supported on virtualized GPU environments.

Parameters:

device The identifier of the target device

counter The specific counter that should be queried nvmlPcieUtilCounter_t

value Reference in which to return throughput in KB/s

Returns:

- NVML_SUCCESS if *value* has been set
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *device* or *counter* is invalid, or *value* is NULL
- NVML_ERROR_NOT_SUPPORTED if the device does not support this feature
- NVML_ERROR_GPU_IS_LOST if the target GPU has fallen off the bus or is otherwise inaccessible
- NVML_ERROR_UNKNOWN on any unexpected error

6.11.2.50 nvmlReturn_t DECLDIR nvmlDeviceGetPciInfo (nvmlDevice_t *device*, nvmlPciInfo_t * *pci*)

Retrieves the PCI attributes of this device.

For all products.

See nvmlPciInfo_t for details on the available PCI info.

Parameters:

device The identifier of the target device

pci Reference in which to return the PCI info

Returns:

- NVML_SUCCESS if *pci* has been populated
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *device* is invalid or *pci* is NULL
- NVML_ERROR_GPU_IS_LOST if the target GPU has fallen off the bus or is otherwise inaccessible
- NVML_ERROR_UNKNOWN on any unexpected error

6.11.2.51 nvmlReturn_t DECLDIR nvmlDeviceGetPerformanceState (nvmlDevice_t *device*, nvmlPstates_t * *pState*)

Retrieves the current performance state for the device.

For Fermi ™or newer fully supported devices.

See nvmlPstates_t for details on allowed performance states.

Parameters:

device The identifier of the target device

pState Reference in which to return the performance state reading

Returns:

- NVML_SUCCESS if *pState* has been set
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *device* is invalid or *pState* is NULL
- NVML_ERROR_NOT_SUPPORTED if the device does not support this feature
- NVML_ERROR_GPU_IS_LOST if the target GPU has fallen off the bus or is otherwise inaccessible
- NVML_ERROR_UNKNOWN on any unexpected error

6.11.2.52 nvmlReturn_t DECLDIR nvmlDeviceGetPersistenceMode (nvmlDevice_t *device*, nvmlEnableState_t * *mode*)

Retrieves the persistence mode associated with this device.

For all products. For Linux only.

When driver persistence mode is enabled the driver software state is not torn down when the last client disconnects. By default this feature is disabled.

See nvmlEnableState_t for details on allowed modes.

Parameters:

device The identifier of the target device

mode Reference in which to return the current driver persistence mode

Returns:

- NVML_SUCCESS if *mode* has been set
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *device* is invalid or *mode* is NULL
- NVML_ERROR_NOT_SUPPORTED if the device does not support this feature
- NVML_ERROR_GPU_IS_LOST if the target GPU has fallen off the bus or is otherwise inaccessible
- NVML_ERROR_UNKNOWN on any unexpected error

See also:

nvmlDeviceSetPersistenceMode()

6.11.2.53 nvmlReturn_t DECLDIR nvmlDeviceGetPowerManagementDefaultLimit (nvmlDevice_t *device*, unsigned int * *defaultLimit*)

Retrieves default power management limit on this device, in milliwatts. Default power management limit is a power management limit that the device boots with.

For Kepler ™or newer fully supported devices.

Parameters:

device The identifier of the target device

defaultLimit Reference in which to return the default power management limit in milliwatts

Returns:

- NVML_SUCCESS if *defaultLimit* has been set
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *device* is invalid or *defaultLimit* is NULL
- NVML_ERROR_NOT_SUPPORTED if the device does not support this feature
- NVML_ERROR_GPU_IS_LOST if the target GPU has fallen off the bus or is otherwise inaccessible
- NVML_ERROR_UNKNOWN on any unexpected error

6.11.2.54 nvmlReturn_t DECLDIR nvmlDeviceGetPowerManagementLimit (nvmlDevice_t *device*, unsigned int * *limit*)

Retrieves the power management limit associated with this device.

For Fermi ™or newer fully supported devices.

The power limit defines the upper boundary for the card's power draw. If the card's total power draw reaches this limit the power management algorithm kicks in.

This reading is only available if power management mode is supported. See nvmlDeviceGetPowerManagementMode.

Parameters:

device The identifier of the target device

limit Reference in which to return the power management limit in milliwatts

Returns:

- NVML_SUCCESS if *limit* has been set
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *device* is invalid or *limit* is NULL
- NVML_ERROR_NOT_SUPPORTED if the device does not support this feature
- NVML_ERROR_GPU_IS_LOST if the target GPU has fallen off the bus or is otherwise inaccessible
- NVML_ERROR_UNKNOWN on any unexpected error

6.11.2.55 nvmlReturn_t DECLDIR nvmlDeviceGetPowerManagementLimitConstraints (nvmlDevice_t *device*, unsigned int * *minLimit*, unsigned int * *maxLimit*)

Retrieves information about possible values of power management limits on this device.

For Kepler ™or newer fully supported devices.

Parameters:

device The identifier of the target device

minLimit Reference in which to return the minimum power management limit in milliwatts

maxLimit Reference in which to return the maximum power management limit in milliwatts

Returns:

- NVML_SUCCESS if *minLimit* and *maxLimit* have been set
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *device* is invalid or *minLimit* or *maxLimit* is NULL
- NVML_ERROR_NOT_SUPPORTED if the device does not support this feature
- NVML_ERROR_GPU_IS_LOST if the target GPU has fallen off the bus or is otherwise inaccessible
- NVML_ERROR_UNKNOWN on any unexpected error

See also:

nvmlDeviceSetPowerManagementLimit

6.11.2.56 nvmlReturn_t DECLDIR nvmlDeviceGetPowerManagementMode (nvmlDevice_t *device*, nvmlEnableState_t * *mode*)

This API has been deprecated.

Retrieves the power management mode associated with this device.

For products from the Fermi family.

- Requires *NVML_INFOROM_POWER* version 3.0 or higher.

For from the Kepler or newer families.

- Does not require *NVML_INFOROM_POWER* object.

This flag indicates whether any power management algorithm is currently active on the device. An enabled state does not necessarily mean the device is being actively throttled – only that that the driver will do so if the appropriate conditions are met.

See nvmlEnableState_t for details on allowed modes.

Parameters:

device The identifier of the target device

mode Reference in which to return the current power management mode

Returns:

- NVML_SUCCESS if *mode* has been set
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *device* is invalid or *mode* is NULL
- NVML_ERROR_NOT_SUPPORTED if the device does not support this feature
- NVML_ERROR_GPU_IS_LOST if the target GPU has fallen off the bus or is otherwise inaccessible
- NVML_ERROR_UNKNOWN on any unexpected error

6.11.2.57 nvmlReturn_t DECLDIR nvmlDeviceGetPowerState (nvmlDevice_t *device*, nvmlPstates_t * *pState*)

Deprecated: Use nvmlDeviceGetPerformanceState. This function exposes an incorrect generalization.

Retrieve the current performance state for the device.

For Fermi ™or newer fully supported devices.

See nvmlPstates_t for details on allowed performance states.

Parameters:

device The identifier of the target device

pState Reference in which to return the performance state reading

Returns:

- NVML_SUCCESS if *pState* has been set
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized

- NVML_ERROR_INVALID_ARGUMENT if *device* is invalid or *pState* is NULL
- NVML_ERROR_NOT_SUPPORTED if the device does not support this feature
- NVML_ERROR_GPU_IS_LOST if the target GPU has fallen off the bus or is otherwise inaccessible
- NVML_ERROR_UNKNOWN on any unexpected error

6.11.2.58 nvmlReturn_t DECLDIR nvmlDeviceGetPowerUsage (nvmlDevice_t *device*, unsigned int * *power*)

Retrieves power usage for this GPU in milliwatts and its associated circuitry (e.g. memory)

For Fermi ™or newer fully supported devices.

On Fermi and Kepler GPUs the reading is accurate to within +/- 5% of current power draw.

It is only available if power management mode is supported. See nvmlDeviceGetPowerManagementMode.

Parameters:

device The identifier of the target device

power Reference in which to return the power usage information

Returns:

- NVML_SUCCESS if *power* has been populated
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *device* is invalid or *power* is NULL
- NVML_ERROR_NOT_SUPPORTED if the device does not support power readings
- NVML_ERROR_GPU_IS_LOST if the target GPU has fallen off the bus or is otherwise inaccessible
- NVML_ERROR_UNKNOWN on any unexpected error

6.11.2.59 nvmlReturn_t DECLDIR nvmlDeviceGetRetiredPages (nvmlDevice_t *device*, nvmlPageRetirementCause_t *cause*, unsigned int * *pageCount*, unsigned long long * *addresses*)

Returns the list of retired pages by source, including pages that are pending retirement The address information provided from this API is the hardware address of the page that was retired. Note that this does not match the virtual address used in CUDA, but will match the address information in XID 63

For Kepler ™or newer fully supported devices.

Parameters:

device The identifier of the target device

cause Filter page addresses by cause of retirement

pageCount Reference in which to provide the *addresses* buffer size, and to return the number of retired pages that match *cause* Set to 0 to query the size without allocating an *addresses* buffer

addresses Buffer to write the page addresses into

Returns:

- NVML_SUCCESS if *pageCount* was populated and *addresses* was filled
- NVML_ERROR_INSUFFICIENT_SIZE if *pageCount* indicates the buffer is not large enough to store all the matching page addresses. *pageCount* is set to the needed size.

- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *device* is invalid, *pageCount* is NULL, *cause* is invalid, or *addresses* is NULL
- NVML_ERROR_NOT_SUPPORTED if the device doesn't support this feature
- NVML_ERROR_GPU_IS_LOST if the target GPU has fallen off the bus or is otherwise inaccessible
- NVML_ERROR_UNKNOWN on any unexpected error

6.11.2.60 nvmlReturn_t DECLDIR nvmlDeviceGetRetiredPagesPendingStatus (nvmlDevice_t *device*, nvmlEnableState_t * *isPending*)

Check if any pages are pending retirement and need a reboot to fully retire.

For Kepler ™or newer fully supported devices.

Parameters:

device The identifier of the target device

isPending Reference in which to return the pending status

Returns:

- NVML_SUCCESS if *isPending* was populated
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *device* is invalid or *isPending* is NULL
- NVML_ERROR_NOT_SUPPORTED if the device doesn't support this feature
- NVML_ERROR_GPU_IS_LOST if the target GPU has fallen off the bus or is otherwise inaccessible
- NVML_ERROR_UNKNOWN on any unexpected error

6.11.2.61 nvmlReturn_t DECLDIR nvmlDeviceGetSamples (nvmlDevice_t *device*, nvmlSamplingType_t *type*, unsigned long long *lastSeenTimeStamp*, nvmlValueType_t * *sampleValType*, unsigned int * *sampleCount*, nvmlSample_t * *samples*)

Gets recent samples for the GPU.

For Kepler ™or newer fully supported devices.

Based on type, this method can be used to fetch the power, utilization or clock samples maintained in the buffer by the driver.

Power, Utilization and Clock samples are returned as type "unsigned int" for the union nvmlValue_t.

To get the size of samples that user needs to allocate, the method is invoked with samples set to NULL. The returned samplesCount will provide the number of samples that can be queried. The user needs to allocate the buffer with size as samplesCount * sizeof(nvmlSample_t).

lastSeenTimeStamp represents CPU timestamp in microseconds. Set it to 0 to fetch all the samples maintained by the underlying buffer. Set lastSeenTimeStamp to one of the timeStamps retrieved from the date of the previous query to get more recent samples.

This method fetches the number of entries which can be accommodated in the provided samples array, and the reference samplesCount is updated to indicate how many samples were actually retrieved. The advantage of using this method for samples in contrast to polling via existing methods is to get get higher frequency data at lower polling cost.

Parameters:

device The identifier for the target device

type Type of sampling event

lastSeenTimeStamp Return only samples with timestamp greater than lastSeenTimeStamp.

sampleValType Output parameter to represent the type of sample value as described in nvmlSampleVal_t

sampleCount Reference to provide the number of elements which can be queried in samples array

samples Reference in which samples are returned

Returns:

- NVML_SUCCESS if samples are successfully retrieved
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *device* is invalid, *samplesCount* is NULL or reference to *sampleCount* is 0 for non null *samples*
- NVML_ERROR_NOT_SUPPORTED if this query is not supported by the device
- NVML_ERROR_GPU_IS_LOST if the target GPU has fallen off the bus or is otherwise inaccessible
- NVML_ERROR_NOT_FOUND if sample entries are not found
- NVML_ERROR_UNKNOWN on any unexpected error

6.11.2.62 nvmlReturn_t DECLDIR nvmlDeviceGetSerial (nvmlDevice_t *device*, char * *serial*, unsigned int *length*)

Retrieves the globally unique board serial number associated with this device's board.

For all products with an inforom.

The serial number is an alphanumeric string that will not exceed 30 characters (including the NULL terminator). This number matches the serial number tag that is physically attached to the board. See nvmlConstants::NVML_DEVICE_SERIAL_BUFFER_SIZE.

Parameters:

device The identifier of the target device

serial Reference in which to return the board/module serial number

length The maximum allowed length of the string returned in *serial*

Returns:

- NVML_SUCCESS if *serial* has been set
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *device* is invalid, or *serial* is NULL
- NVML_ERROR_INSUFFICIENT_SIZE if *length* is too small
- NVML_ERROR_NOT_SUPPORTED if the device does not support this feature
- NVML_ERROR_GPU_IS_LOST if the target GPU has fallen off the bus or is otherwise inaccessible
- NVML_ERROR_UNKNOWN on any unexpected error

6.11.2.63 nvmlReturn_t DECLDIR nvmlDeviceGetSupportedClocksThrottleReasons (nvmlDevice_t *device*, unsigned long long * *supportedClocksThrottleReasons*)

Retrieves bitmask of supported clocks throttle reasons that can be returned by nvmlDeviceGetCurrentClocksThrottleReasons

For all fully supported products.

This method is not supported on virtualized GPU environments.

Parameters:

device The identifier of the target device

supportedClocksThrottleReasons Reference in which to return bitmask of supported clocks throttle reasons

Returns:

- NVML_SUCCESS if *supportedClocksThrottleReasons* has been set
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *device* is invalid or *supportedClocksThrottleReasons* is NULL
- NVML_ERROR_GPU_IS_LOST if the target GPU has fallen off the bus or is otherwise inaccessible
- NVML_ERROR_UNKNOWN on any unexpected error

See also:

NvmlClocksThrottleReasons
nvmlDeviceGetCurrentClocksThrottleReasons

6.11.2.64 nvmlReturn_t DECLDIR nvmlDeviceGetSupportedGraphicsClocks (nvmlDevice_t *device*, unsigned int *memoryClockMHz*, unsigned int * *count*, unsigned int * *clocksMHz*)

Retrieves the list of possible graphics clocks that can be used as an argument for nvmlDeviceSetApplicationsClocks.

For Kepler ™or newer fully supported devices.

Parameters:

device The identifier of the target device

memoryClockMHz Memory clock for which to return possible graphics clocks

count Reference in which to provide the *clocksMHz* array size, and to return the number of elements

clocksMHz Reference in which to return the clocks in MHz

Returns:

- NVML_SUCCESS if *count* and *clocksMHz* have been populated
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_NOT_FOUND if the specified *memoryClockMHz* is not a supported frequency
- NVML_ERROR_INVALID_ARGUMENT if *device* is invalid or *clock* is NULL
- NVML_ERROR_NOT_SUPPORTED if the device does not support this feature
- NVML_ERROR_INSUFFICIENT_SIZE if *count* is too small
- NVML_ERROR_GPU_IS_LOST if the target GPU has fallen off the bus or is otherwise inaccessible
- NVML_ERROR_UNKNOWN on any unexpected error

See also:

nvmlDeviceSetApplicationsClocks
nvmlDeviceGetSupportedMemoryClocks

6.11.2.65 nvmlReturn_t DECLDIR nvmlDeviceGetSupportedMemoryClocks (nvmlDevice_t *device*, unsigned int * *count*, unsigned int * *clocksMHz*)

Retrieves the list of possible memory clocks that can be used as an argument for nvmlDeviceSetApplicationsClocks.

For Kepler ™or newer fully supported devices.

Parameters:

device The identifier of the target device

count Reference in which to provide the *clocksMHz* array size, and to return the number of elements

clocksMHz Reference in which to return the clock in MHz

Returns:

- NVML_SUCCESS if *count* and *clocksMHz* have been populated
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *device* is invalid or *count* is NULL
- NVML_ERROR_NOT_SUPPORTED if the device does not support this feature
- NVML_ERROR_INSUFFICIENT_SIZE if *count* is too small (*count* is set to the number of required elements)
- NVML_ERROR_GPU_IS_LOST if the target GPU has fallen off the bus or is otherwise inaccessible
- NVML_ERROR_UNKNOWN on any unexpected error

See also:

nvmlDeviceSetApplicationsClocks
nvmlDeviceGetSupportedGraphicsClocks

6.11.2.66 nvmlReturn_t DECLDIR nvmlDeviceGetTemperature (nvmlDevice_t *device*, nvmlTemperatureSensors_t *sensorType*, unsigned int * *temp*)

Retrieves the current temperature readings for the device, in degrees C.

For all products.

See nvmlTemperatureSensors_t for details on available temperature sensors.

Parameters:

device The identifier of the target device

sensorType Flag that indicates which sensor reading to retrieve

temp Reference in which to return the temperature reading

Returns:

- NVML_SUCCESS if *temp* has been set

- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *device* is invalid, *sensorType* is invalid or *temp* is NULL
- NVML_ERROR_NOT_SUPPORTED if the device does not have the specified sensor
- NVML_ERROR_GPU_IS_LOST if the target GPU has fallen off the bus or is otherwise inaccessible
- NVML_ERROR_UNKNOWN on any unexpected error

6.11.2.67 nvmlReturn_t DECLDIR nvmlDeviceGetTemperatureThreshold (nvmlDevice_t *device*, nvmlTemperatureThresholds_t *thresholdType*, unsigned int * *temp*)

Retrieves the temperature threshold for the GPU with the specified threshold type in degrees C.

For Kepler ™or newer fully supported devices.

See nvmlTemperatureThresholds_t for details on available temperature thresholds.

Parameters:

device The identifier of the target device

thresholdType The type of threshold value queried

temp Reference in which to return the temperature reading

Returns:

- NVML_SUCCESS if *temp* has been set
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *device* is invalid, *thresholdType* is invalid or *temp* is NULL
- NVML_ERROR_NOT_SUPPORTED if the device does not have a temperature sensor or is unsupported
- NVML_ERROR_GPU_IS_LOST if the target GPU has fallen off the bus or is otherwise inaccessible
- NVML_ERROR_UNKNOWN on any unexpected error

6.11.2.68 nvmlReturn_t DECLDIR nvmlDeviceGetTopologyCommonAncestor (nvmlDevice_t *device1*, nvmlDevice_t *device2*, nvmlGpuTopologyLevel_t * *pathInfo*)

Retrieve the common ancestor for two devices For all products. Supported on Linux only.

Parameters:

device1 The identifier of the first device

device2 The identifier of the second device

pathInfo A nvmlGpuTopologyLevel_t that gives the path type

Returns:

- NVML_SUCCESS if *pathInfo* has been set
- NVML_ERROR_INVALID_ARGUMENT if *device1*, or *device2* is invalid, or *pathInfo* is NULL
- NVML_ERROR_NOT_SUPPORTED if the device or OS does not support this feature
- NVML_ERROR_UNKNOWN an error has occurred in underlying topology discovery

6.11.2.69 nvmlReturn_t DECLDIR nvmlDeviceGetTopologyNearestGpus (nvmlDevice_t *device*, nvmlGpuTopologyLevel_t *level*, unsigned int * *count*, nvmlDevice_t * *deviceArray*)

Retrieve the set of GPUs that are nearest to a given device at a specific interconnectivity level For all products. Supported on Linux only.

Parameters:

device The identifier of the first device

level The nvmlGpuTopologyLevel_t level to search for other GPUs

count When zero, is set to the number of matching GPUs such that *deviceArray* can be malloc'd. When non-zero, *deviceArray* will be filled with *count* number of device handles.

deviceArray An array of device handles for GPUs found at *level*

Returns:

- NVML_SUCCESS if *deviceArray* or *count* (if initially zero) has been set
- NVML_ERROR_INVALID_ARGUMENT if *device*, *level*, or *count* is invalid, or *deviceArray* is NULL with a non-zero *count*
- NVML_ERROR_NOT_SUPPORTED if the device or OS does not support this feature
- NVML_ERROR_UNKNOWN an error has occurred in underlying topology discovery

6.11.2.70 nvmlReturn_t DECLDIR nvmlDeviceGetTotalEccErrors (nvmlDevice_t *device*, nvmlMemoryErrorType_t *errorType*, nvmlEccCounterType_t *counterType*, unsigned long long * *eccCounts*)

Retrieves the total ECC error counts for the device.

For Fermi ™or newer fully supported devices. Only applicable to devices with ECC. Requires *NVML_INFOROM_-ECC* version 1.0 or higher. Requires ECC Mode to be enabled.

The total error count is the sum of errors across each of the separate memory systems, i.e. the total set of errors across the entire device.

See nvmlMemoryErrorType_t for a description of available error types.

See nvmlEccCounterType_t for a description of available counter types.

Parameters:

device The identifier of the target device

errorType Flag that specifies the type of the errors.

counterType Flag that specifies the counter-type of the errors.

eccCounts Reference in which to return the specified ECC errors

Returns:

- NVML_SUCCESS if *eccCounts* has been set
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *device*, *errorType* or *counterType* is invalid, or *eccCounts* is NULL
- NVML_ERROR_NOT_SUPPORTED if the device does not support this feature

- NVML_ERROR_GPU_IS_LOST if the target GPU has fallen off the bus or is otherwise inaccessible
- NVML_ERROR_UNKNOWN on any unexpected error

See also:

nvmlDeviceClearEccErrorCounts()

6.11.2.71 nvmlReturn_t DECLDIR nvmlDeviceGetUtilizationRates (nvmlDevice_t *device*, nvmlUtilization_t * *utilization*)

Retrieves the current utilization rates for the device's major subsystems.

For Fermi ™or newer fully supported devices.

See nvmlUtilization_t for details on available utilization rates.

Note:

During driver initialization when ECC is enabled one can see high GPU and Memory Utilization readings. This is caused by ECC Memory Scrubbing mechanism that is performed during driver initialization.

Parameters:

device The identifier of the target device

utilization Reference in which to return the utilization information

Returns:

- NVML_SUCCESS if *utilization* has been populated
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *device* is invalid or *utilization* is NULL
- NVML_ERROR_NOT_SUPPORTED if the device does not support this feature
- NVML_ERROR_GPU_IS_LOST if the target GPU has fallen off the bus or is otherwise inaccessible
- NVML_ERROR_UNKNOWN on any unexpected error

6.11.2.72 nvmlReturn_t DECLDIR nvmlDeviceGetUUID (nvmlDevice_t *device*, char * *uuid*, unsigned int *length*)

Retrieves the globally unique immutable UUID associated with this device, as a 5 part hexadecimal string, that augments the immutable, board serial identifier.

For all products.

The UUID is a globally unique identifier. It is the only available identifier for pre-Fermi-architecture products. It does NOT correspond to any identifier printed on the board. It will not exceed 80 characters in length (including the NULL terminator). See nvmlConstants::NVML_DEVICE_UUID_BUFFER_SIZE.

Parameters:

device The identifier of the target device

uuid Reference in which to return the GPU UUID

length The maximum allowed length of the string returned in *uuid*

Returns:

- NVML_SUCCESS if *uuid* has been set
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *device* is invalid, or *uuid* is NULL
- NVML_ERROR_INSUFFICIENT_SIZE if *length* is too small
- NVML_ERROR_NOT_SUPPORTED if the device does not support this feature
- NVML_ERROR_GPU_IS_LOST if the target GPU has fallen off the bus or is otherwise inaccessible
- NVML_ERROR_UNKNOWN on any unexpected error

6.11.2.73 nvmlReturn_t DECLDIR nvmlDeviceGetVbiosVersion (nvmlDevice_t *device*, char * *version*, unsigned int *length*)

Get VBIOS version of the device.

For all products.

The VBIOS version may change from time to time. It will not exceed 32 characters in length (including the NULL terminator). See nvmlConstants::NVML_DEVICE_VBIOS_VERSION_BUFFER_SIZE.

Parameters:

device The identifier of the target device

version Reference to which to return the VBIOS version

length The maximum allowed length of the string returned in *version*

Returns:

- NVML_SUCCESS if *version* has been set
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *device* is invalid, or *version* is NULL
- NVML_ERROR_INSUFFICIENT_SIZE if *length* is too small
- NVML_ERROR_GPU_IS_LOST if the target GPU has fallen off the bus or is otherwise inaccessible
- NVML_ERROR_UNKNOWN on any unexpected error

6.11.2.74 nvmlReturn_t DECLDIR nvmlDeviceGetViolationStatus (nvmlDevice_t *device*, nvmlPerfPolicyType_t *perfPolicyType*, nvmlViolationTime_t * *violTime*)

Gets the duration of time during which the device was throttled (lower than requested clocks) due to power or thermal constraints.

The method is important to users who are tying to understand if their GPUs throttle at any point during their applications. The difference in violation times at two different reference times gives the indication of GPU throttling event.

Violation for thermal capping is not supported at this time.

For Kepler ™or newer fully supported devices.

Parameters:

device The identifier of the target device

perfPolicyType Represents Performance policy which can trigger GPU throttling

violTime Reference to which violation time related information is returned

Returns:

- NVML_SUCCESS if violation time is successfully retrieved
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *device* is invalid, *perfPolicyType* is invalid, or *violTime* is NULL
- NVML_ERROR_NOT_SUPPORTED if this query is not supported by the device
- NVML_ERROR_GPU_IS_LOST if the target GPU has fallen off the bus or is otherwise inaccessible

6.11.2.75 nvmlReturn_t DECLDIR nvmlDeviceOnSameBoard (nvmlDevice_t *device1*, nvmlDevice_t *device2*, int ∗ *onSameBoard*)

Check if the GPU devices are on the same physical board.

For all fully supported products.

Parameters:

device1 The first GPU device

device2 The second GPU device

onSameBoard Reference in which to return the status. Non-zero indicates that the GPUs are on the same board.

Returns:

- NVML_SUCCESS if *onSameBoard* has been set
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *dev1* or *dev2* are invalid or *onSameBoard* is NULL
- NVML_ERROR_NOT_SUPPORTED if this check is not supported by the device
- NVML_ERROR_GPU_IS_LOST if the either GPU has fallen off the bus or is otherwise inaccessible
- NVML_ERROR_UNKNOWN on any unexpected error

6.11.2.76 nvmlReturn_t DECLDIR nvmlDeviceResetApplicationsClocks (nvmlDevice_t *device*)

Resets the application clock to the default value

This is the applications clock that will be used after system reboot or driver reload. Default value is constant, but the current value an be changed using nvmlDeviceSetApplicationsClocks.

See also:

nvmlDeviceGetApplicationsClock
nvmlDeviceSetApplicationsClocks

For Fermi ™or newer non-GeForce fully supported devices and Maxwell or newer GeForce devices.

Parameters:

device The identifier of the target device

Returns:

- NVML_SUCCESS if new settings were successfully set
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *device* is invalid
- NVML_ERROR_NOT_SUPPORTED if the device does not support this feature
- NVML_ERROR_GPU_IS_LOST if the target GPU has fallen off the bus or is otherwise inaccessible
- NVML_ERROR_UNKNOWN on any unexpected error

6.11.2.77 nvmlReturn_t DECLDIR nvmlDeviceSetAutoBoostedClocksEnabled (nvmlDevice_t *device*, nvmlEnableState_t *enabled*)

Try to set the current state of auto boosted clocks on a device.

For Kepler ™or newer fully supported devices.

Auto boosted clocks are enabled by default on some hardware, allowing the GPU to run at higher clock rates to maximize performance as thermal limits allow. Auto boosted clocks should be disabled if fixed clock rates are desired. Non-root users may use this API by default but can be restricted by root from using this API by calling nvmlDeviceSetAPIRestriction with apiType=NVML_RESTRICTED_API_SET_AUTO_BOOSTED_CLOCKS. Note: Persistence Mode is required to modify current Auto boost settings, therefore, it must be enabled.

Parameters:

device The identifier of the target device

enabled What state to try to set auto boosted clocks of the target device to

Returns:

- NVML_SUCCESS If the auto boosted clocks were successfully set to the state specified by *enabled*
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *device* is invalid
- NVML_ERROR_NOT_SUPPORTED if the device does not support auto boosted clocks
- NVML_ERROR_GPU_IS_LOST if the target GPU has fallen off the bus or is otherwise inaccessible
- NVML_ERROR_UNKNOWN on any unexpected error

6.11.2.78 nvmlReturn_t DECLDIR nvmlDeviceSetCpuAffinity (nvmlDevice_t *device*)

Sets the ideal affinity for the calling thread and device using the guidelines given in nvmlDeviceGetCpuAffinity(). Note, this is a change as of version 8.0. Older versions set the affinity for a calling process and all children. Currently supports up to 64 processors.

For Kepler ™or newer fully supported devices. Supported on Linux only.

Parameters:

device The identifier of the target device

Returns:

- NVML_SUCCESS if the calling process has been successfully bound

- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *device* is invalid
- NVML_ERROR_NOT_SUPPORTED if the device does not support this feature
- NVML_ERROR_GPU_IS_LOST if the target GPU has fallen off the bus or is otherwise inaccessible
- NVML_ERROR_UNKNOWN on any unexpected error

6.11.2.79 nvmlReturn_t DECLDIR nvmlDeviceSetDefaultAutoBoostedClocksEnabled (nvmlDevice_t *device*, nvmlEnableState_t *enabled*, unsigned int *flags*)

Try to set the default state of auto boosted clocks on a device. This is the default state that auto boosted clocks will return to when no compute running processes (e.g. CUDA application which have an active context) are running

For Kepler ™or newer non-GeForce fully supported devices and Maxwell or newer GeForce devices. Requires root/admin permissions.

Auto boosted clocks are enabled by default on some hardware, allowing the GPU to run at higher clock rates to maximize performance as thermal limits allow. Auto boosted clocks should be disabled if fixed clock rates are desired.

Parameters:

device The identifier of the target device

enabled What state to try to set default auto boosted clocks of the target device to

flags Flags that change the default behavior. Currently Unused.

Returns:

- NVML_SUCCESS If the auto boosted clock's default state was successfully set to the state specified by *enabled*
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_NO_PERMISSION If the calling user does not have permission to change auto boosted clock's default state.
- NVML_ERROR_INVALID_ARGUMENT if *device* is invalid
- NVML_ERROR_NOT_SUPPORTED if the device does not support auto boosted clocks
- NVML_ERROR_GPU_IS_LOST if the target GPU has fallen off the bus or is otherwise inaccessible
- NVML_ERROR_UNKNOWN on any unexpected error

6.11.2.80 nvmlReturn_t DECLDIR nvmlDeviceValidateInforom (nvmlDevice_t *device*)

Reads the infoROM from the flash and verifies the checksums.

For all products with an inforom.

Parameters:

device The identifier of the target device

Returns:

- NVML_SUCCESS if infoROM is not corrupted
- NVML_ERROR_CORRUPTED_INFOROM if the device's infoROM is corrupted

- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_NOT_SUPPORTED if the device does not support this feature
- NVML_ERROR_GPU_IS_LOST if the target GPU has fallen off the bus or is otherwise inaccessible
- NVML_ERROR_UNKNOWN on any unexpected error

6.11.2.81 nvmlReturn_t DECLDIR nvmlSystemGetTopologyGpuSet (unsigned int *cpuNumber*, unsigned int * *count*, nvmlDevice_t * *deviceArray*)

Retrieve the set of GPUs that have a CPU affinity with the given CPU number For all products. Supported on Linux only.

Parameters:

cpuNumber The CPU number

count When zero, is set to the number of matching GPUs such that *deviceArray* can be malloc'd. When non-zero, *deviceArray* will be filled with *count* number of device handles.

deviceArray An array of device handles for GPUs found with affinity to *cpuNumber*

Returns:

- NVML_SUCCESS if *deviceArray* or *count* (if initially zero) has been set
- NVML_ERROR_INVALID_ARGUMENT if *cpuNumber*, or *count* is invalid, or *deviceArray* is NULL with a non-zero *count*
- NVML_ERROR_NOT_SUPPORTED if the device or OS does not support this feature
- NVML_ERROR_UNKNOWN an error has occurred in underlying topology discovery

6.12 Unit Commands

Functions

- nvmlReturn_t DECLDIR nvmlUnitSetLedState (nvmlUnit_t unit, nvmlLedColor_t color)

6.12.1 Detailed Description

This chapter describes NVML operations that change the state of the unit. For S-class products. Each of these requires root/admin access. Non-admin users will see an NVML_ERROR_NO_PERMISSION error code when invoking any of these methods.

6.12.2 Function Documentation

6.12.2.1 nvmlReturn_t DECLDIR nvmlUnitSetLedState (nvmlUnit_t *unit*, nvmlLedColor_t *color*)

Set the LED state for the unit. The LED can be either green (0) or amber (1).

For S-class products. Requires root/admin permissions.

This operation takes effect immediately.

Current S-Class products don't provide unique LEDs for each unit. As such, both front and back LEDs will be toggled in unison regardless of which unit is specified with this command.

See nvmlLedColor_t for available colors.

Parameters:

unit The identifier of the target unit

color The target LED color

Returns:

- NVML_SUCCESS if the LED color has been set
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *unit* or *color* is invalid
- NVML_ERROR_NOT_SUPPORTED if this is not an S-class product
- NVML_ERROR_NO_PERMISSION if the user doesn't have permission to perform this operation
- NVML_ERROR_UNKNOWN on any unexpected error

See also:

nvmlUnitGetLedState()

6.13 Device Commands

Functions

- nvmlReturn_t DECLDIR nvmlDeviceSetPersistenceMode (nvmlDevice_t device, nvmlEnableState_t mode)
- nvmlReturn_t DECLDIR nvmlDeviceSetComputeMode (nvmlDevice_t device, nvmlComputeMode_t mode)
- nvmlReturn_t DECLDIR nvmlDeviceSetEccMode (nvmlDevice_t device, nvmlEnableState_t ecc)
- nvmlReturn_t DECLDIR nvmlDeviceClearEccErrorCounts (nvmlDevice_t device, nvmlEccCounterType_t counterType)
- nvmlReturn_t DECLDIR nvmlDeviceSetDriverModel (nvmlDevice_t device, nvmlDriverModel_t driverModel, unsigned int flags)
- nvmlReturn_t DECLDIR nvmlDeviceSetApplicationsClocks (nvmlDevice_t device, unsigned int memClockMHz, unsigned int graphicsClockMHz)
- nvmlReturn_t DECLDIR nvmlDeviceSetPowerManagementLimit (nvmlDevice_t device, unsigned int limit)
- nvmlReturn_t DECLDIR nvmlDeviceSetGpuOperationMode (nvmlDevice_t device, nvmlGpuOperationMode_t mode)
- nvmlReturn_t DECLDIR nvmlDeviceSetAPIRestriction (nvmlDevice_t device, nvmlRestrictedAPI_t apiType, nvmlEnableState_t isRestricted)

6.13.1 Detailed Description

This chapter describes NVML operations that change the state of the device. Each of these requires root/admin access. Non-admin users will see an NVML_ERROR_NO_PERMISSION error code when invoking any of these methods.

6.13.2 Function Documentation

6.13.2.1 nvmlReturn_t DECLDIR nvmlDeviceClearEccErrorCounts (nvmlDevice_t *device*, nvmlEccCounterType_t *counterType*)

Clear the ECC error and other memory error counts for the device.

For Kepler ™or newer fully supported devices. Only applicable to devices with ECC. Requires *NVML_INFOROM_ECC* version 2.0 or higher to clear aggregate location-based ECC counts. Requires *NVML_INFOROM_ECC* version 1.0 or higher to clear all other ECC counts. Requires root/admin permissions. Requires ECC Mode to be enabled.

Sets all of the specified ECC counters to 0, including both detailed and total counts.

This operation takes effect immediately.

See nvmlMemoryErrorType_t for details on available counter types.

Parameters:

device The identifier of the target device

counterType Flag that indicates which type of errors should be cleared.

Returns:

- NVML_SUCCESS if the error counts were cleared
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *device* is invalid or *counterType* is invalid
- NVML_ERROR_NOT_SUPPORTED if the device does not support this feature
- NVML_ERROR_NO_PERMISSION if the user doesn't have permission to perform this operation

- NVML_ERROR_GPU_IS_LOST if the target GPU has fallen off the bus or is otherwise inaccessible
- NVML_ERROR_UNKNOWN on any unexpected error

See also:

- nvmlDeviceGetDetailedEccErrors()
- nvmlDeviceGetTotalEccErrors()

6.13.2.2 nvmlReturn_t DECLDIR nvmlDeviceSetAPIRestriction (nvmlDevice_t *device*, nvmlRestrictedAPI_t *apiType*, nvmlEnableState_t *isRestricted*)

Changes the root/admin restructions on certain APIs. See *nvmlRestrictedAPI_t* for the list of supported APIs. This method can be used by a root/admin user to give non-root/admin access to certain otherwise-restricted APIs. The new setting lasts for the lifetime of the NVIDIA driver; it is not persistent. See *nvmlDeviceGetAPIRestriction* to query the current restriction settings.

For Kepler ™or newer fully supported devices. Requires root/admin permissions.

Parameters:

device The identifier of the target device

apiType Target API type for this operation

isRestricted The target restriction

Returns:

- NVML_SUCCESS if *isRestricted* has been set
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *device* is invalid or *apiType* incorrect
- NVML_ERROR_NOT_SUPPORTED if the device does not support changing API restrictions or the device does not support the feature that api restrictions are being set for (E.G. Enabling/disabling auto boosted clocks is not supported by the device)
- NVML_ERROR_NO_PERMISSION if the user doesn't have permission to perform this operation
- NVML_ERROR_GPU_IS_LOST if the target GPU has fallen off the bus or is otherwise inaccessible
- NVML_ERROR_UNKNOWN on any unexpected error

See also:

nvmlRestrictedAPI_t

6.13.2.3 nvmlReturn_t DECLDIR nvmlDeviceSetApplicationsClocks (nvmlDevice_t *device*, unsigned int *memClockMHz*, unsigned int *graphicsClockMHz*)

Set clocks that applications will lock to.

Sets the clocks that compute and graphics applications will be running at. e.g. CUDA driver requests these clocks during context creation which means this property defines clocks at which CUDA applications will be running unless some overspec event occurs (e.g. over power, over thermal or external HW brake).

Can be used as a setting to request constant performance.

For Kepler ™or newer non-GeForce fully supported devices and Maxwell or newer GeForce devices. Requires root/admin permissions.

See nvmlDeviceGetSupportedMemoryClocks and nvmlDeviceGetSupportedGraphicsClocks for details on how to list available clocks combinations.

After system reboot or driver reload applications clocks go back to their default value. See nvmlDeviceResetApplicationsClocks.

Parameters:

device The identifier of the target device

memClockMHz Requested memory clock in MHz

graphicsClockMHz Requested graphics clock in MHz

Returns:

- NVML_SUCCESS if new settings were successfully set
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *device* is invalid or *memClockMHz* and *graphicsClockMHz* is not a valid clock combination
- NVML_ERROR_NO_PERMISSION if the user doesn't have permission to perform this operation
- NVML_ERROR_NOT_SUPPORTED if the device doesn't support this feature
- NVML_ERROR_GPU_IS_LOST if the target GPU has fallen off the bus or is otherwise inaccessible
- NVML_ERROR_UNKNOWN on any unexpected error

6.13.2.4 nvmlReturn_t DECLDIR nvmlDeviceSetComputeMode (nvmlDevice_t *device*, nvmlComputeMode_t *mode*)

Set the compute mode for the device.

For all products. Requires root/admin permissions.

The compute mode determines whether a GPU can be used for compute operations and whether it can be shared across contexts.

This operation takes effect immediately. Under Linux it is not persistent across reboots and always resets to "Default". Under windows it is persistent.

Under windows compute mode may only be set to DEFAULT when running in WDDM

See nvmlComputeMode_t for details on available compute modes.

Parameters:

device The identifier of the target device

mode The target compute mode

Returns:

- NVML_SUCCESS if the compute mode was set
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *device* is invalid or *mode* is invalid
- NVML_ERROR_NOT_SUPPORTED if the device does not support this feature

- NVML_ERROR_NO_PERMISSION if the user doesn't have permission to perform this operation
- NVML_ERROR_GPU_IS_LOST if the target GPU has fallen off the bus or is otherwise inaccessible
- NVML_ERROR_UNKNOWN on any unexpected error

See also:

nvmlDeviceGetComputeMode()

6.13.2.5 nvmlReturn_t DECLDIR nvmlDeviceSetDriverModel (nvmlDevice_t *device*, nvmlDriverModel_t *driverModel*, unsigned int *flags*)

Set the driver model for the device.

For Fermi ™or newer fully supported devices. For windows only. Requires root/admin permissions.

On Windows platforms the device driver can run in either WDDM or WDM (TCC) mode. If a display is attached to the device it must run in WDDM mode.

It is possible to force the change to WDM (TCC) while the display is still attached with a force flag (nvmlFlagForce). This should only be done if the host is subsequently powered down and the display is detached from the device before the next reboot.

This operation takes effect after the next reboot.

Windows driver model may only be set to WDDM when running in DEFAULT compute mode.

Change driver model to WDDM is not supported when GPU doesn't support graphics acceleration or will not support it after reboot. See nvmlDeviceSetGpuOperationMode.

See nvmlDriverModel_t for details on available driver models. See nvmlFlagDefault and nvmlFlagForce

Parameters:

device The identifier of the target device

driverModel The target driver model

flags Flags that change the default behavior

Returns:

- NVML_SUCCESS if the driver model has been set
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *device* is invalid or *driverModel* is invalid
- NVML_ERROR_NOT_SUPPORTED if the platform is not windows or the device does not support this feature
- NVML_ERROR_NO_PERMISSION if the user doesn't have permission to perform this operation
- NVML_ERROR_GPU_IS_LOST if the target GPU has fallen off the bus or is otherwise inaccessible
- NVML_ERROR_UNKNOWN on any unexpected error

See also:

nvmlDeviceGetDriverModel()

6.13.2.6 nvmlReturn_t DECLDIR nvmlDeviceSetEccMode (nvmlDevice_t *device*, nvmlEnableState_t *ecc*)

Set the ECC mode for the device.

For Kepler ™or newer fully supported devices. Only applicable to devices with ECC. Requires *NVML_INFOROM_-ECC* version 1.0 or higher. Requires root/admin permissions.

The ECC mode determines whether the GPU enables its ECC support.

This operation takes effect after the next reboot.

See nvmlEnableState_t for details on available modes.

Parameters:

device The identifier of the target device

ecc The target ECC mode

Returns:

- NVML_SUCCESS if the ECC mode was set
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *device* is invalid or *ecc* is invalid
- NVML_ERROR_NOT_SUPPORTED if the device does not support this feature
- NVML_ERROR_NO_PERMISSION if the user doesn't have permission to perform this operation
- NVML_ERROR_GPU_IS_LOST if the target GPU has fallen off the bus or is otherwise inaccessible
- NVML_ERROR_UNKNOWN on any unexpected error

See also:

nvmlDeviceGetEccMode()

6.13.2.7 nvmlReturn_t DECLDIR nvmlDeviceSetGpuOperationMode (nvmlDevice_t *device*, nvmlGpuOperationMode_t *mode*)

Sets new GOM. See *nvmlGpuOperationMode_t* for details.

For GK110 M-class and X-class Tesla ™products from the Kepler family. Modes NVML_GOM_LOW_DP and NVML_GOM_ALL_ON are supported on fully supported GeForce products. Not supported on Quadro ®and Tesla ™C-class products. Requires root/admin permissions.

Changing GOMs requires a reboot. The reboot requirement might be removed in the future.

Compute only GOMs don't support graphics acceleration. Under windows switching to these GOMs when pending driver model is WDDM is not supported. See nvmlDeviceSetDriverModel.

Parameters:

device The identifier of the target device

mode Target GOM

Returns:

- NVML_SUCCESS if *mode* has been set
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized

- NVML_ERROR_INVALID_ARGUMENT if *device* is invalid or *mode* incorrect
- NVML_ERROR_NOT_SUPPORTED if the device does not support GOM or specific mode
- NVML_ERROR_NO_PERMISSION if the user doesn't have permission to perform this operation
- NVML_ERROR_GPU_IS_LOST if the target GPU has fallen off the bus or is otherwise inaccessible
- NVML_ERROR_UNKNOWN on any unexpected error

See also:

nvmlGpuOperationMode_t
nvmlDeviceGetGpuOperationMode

6.13.2.8 nvmlReturn_t DECLDIR nvmlDeviceSetPersistenceMode (nvmlDevice_t *device*, nvmlEnableState_t *mode*)

Set the persistence mode for the device.

For all products. For Linux only. Requires root/admin permissions.

The persistence mode determines whether the GPU driver software is torn down after the last client exits.

This operation takes effect immediately. It is not persistent across reboots. After each reboot the persistence mode is reset to "Disabled".

See nvmlEnableState_t for available modes.

Parameters:

device The identifier of the target device

mode The target persistence mode

Returns:

- NVML_SUCCESS if the persistence mode was set
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *device* is invalid or *mode* is invalid
- NVML_ERROR_NOT_SUPPORTED if the device does not support this feature
- NVML_ERROR_NO_PERMISSION if the user doesn't have permission to perform this operation
- NVML_ERROR_GPU_IS_LOST if the target GPU has fallen off the bus or is otherwise inaccessible
- NVML_ERROR_UNKNOWN on any unexpected error

See also:

nvmlDeviceGetPersistenceMode()

6.13.2.9 nvmlReturn_t DECLDIR nvmlDeviceSetPowerManagementLimit (nvmlDevice_t *device*, unsigned int *limit*)

Set new power limit of this device.

For Kepler ™or newer fully supported devices. Requires root/admin permissions.

See nvmlDeviceGetPowerManagementLimitConstraints to check the allowed ranges of values.

Note:

Limit is not persistent across reboots or driver unloads. Enable persistent mode to prevent driver from unloading when no application is using the device.

Parameters:

device The identifier of the target device

limit Power management limit in milliwatts to set

Returns:

- NVML_SUCCESS if *limit* has been set
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *device* is invalid or *defaultLimit* is out of range
- NVML_ERROR_NOT_SUPPORTED if the device does not support this feature
- NVML_ERROR_GPU_IS_LOST if the target GPU has fallen off the bus or is otherwise inaccessible
- NVML_ERROR_UNKNOWN on any unexpected error

See also:

nvmlDeviceGetPowerManagementLimitConstraints
nvmlDeviceGetPowerManagementDefaultLimit

6.14 NvLink Methods

Functions

- nvmlReturn_t DECLDIR nvmlDeviceGetNvLinkState (nvmlDevice_t device, unsigned int link, nvmlEnableState_t *isActive)
- nvmlReturn_t DECLDIR nvmlDeviceGetNvLinkVersion (nvmlDevice_t device, unsigned int link, unsigned int *version)
- nvmlReturn_t DECLDIR nvmlDeviceGetNvLinkCapability (nvmlDevice_t device, unsigned int link, nvmlNvLinkCapability_t capability, unsigned int *capResult)
- nvmlReturn_t DECLDIR nvmlDeviceGetNvLinkRemotePciInfo (nvmlDevice_t device, unsigned int link, nvmlPciInfo_t *pci)
- nvmlReturn_t DECLDIR nvmlDeviceGetNvLinkErrorCounter (nvmlDevice_t device, unsigned int link, nvmlNvLinkErrorCounter_t counter, unsigned long long *counterValue)
- nvmlReturn_t DECLDIR nvmlDeviceResetNvLinkErrorCounters (nvmlDevice_t device, unsigned int link)
- nvmlReturn_t DECLDIR nvmlDeviceSetNvLinkUtilizationControl (nvmlDevice_t device, unsigned int link, unsigned int counter, nvmlNvLinkUtilizationControl_t *control, unsigned int reset)
- nvmlReturn_t DECLDIR nvmlDeviceGetNvLinkUtilizationControl (nvmlDevice_t device, unsigned int link, unsigned int counter, nvmlNvLinkUtilizationControl_t *control)
- nvmlReturn_t DECLDIR nvmlDeviceGetNvLinkUtilizationCounter (nvmlDevice_t device, unsigned int link, unsigned int counter, unsigned long long *rxcounter, unsigned long long *txcounter)
- nvmlReturn_t DECLDIR nvmlDeviceFreezeNvLinkUtilizationCounter (nvmlDevice_t device, unsigned int link, unsigned int counter, nvmlEnableState_t freeze)
- nvmlReturn_t DECLDIR nvmlDeviceResetNvLinkUtilizationCounter (nvmlDevice_t device, unsigned int link, unsigned int counter)

6.14.1 Detailed Description

This chapter describes methods that NVML can perform on NVLINK enabled devices.

6.14.2 Function Documentation

6.14.2.1 nvmlReturn_t DECLDIR nvmlDeviceFreezeNvLinkUtilizationCounter (nvmlDevice_t *device*, unsigned int *link*, unsigned int *counter*, nvmlEnableState_t *freeze*)

Freeze the NVLINK utilization counters Both the receive and transmit counters are operated on by this function

For newer than Maxwell ™fully supported devices.

Parameters:

device The identifier of the target device

link Specifies the NvLink link to be queried

counter Specifies the counter that should be frozen (0 or 1).

freeze NVML_FEATURE_ENABLED = freeze the receive and transmit counters NVML_FEATURE_-DISABLED = unfreeze the receive and transmit counters

Returns:

- NVML_SUCCESS if counters were successfully frozen or unfrozen
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized

- NVML_ERROR_INVALID_ARGUMENT if *device*, *link*, *counter*, or *freeze* is invalid
- NVML_ERROR_NOT_SUPPORTED if the device doesn't support this feature
- NVML_ERROR_UNKNOWN on any unexpected error

6.14.2.2 nvmlReturn_t DECLDIR nvmlDeviceGetNvLinkCapability (nvmlDevice_t *device*, unsigned int *link*, nvmlNvLinkCapability_t *capability*, unsigned int * *capResult*)

Retrieves the requested capability from the device's NvLink for the link specified Please refer to the *nvmlNvLinkCapability_t* structure for the specific caps that can be queried The return value should be treated as a boolean.

For newer than Maxwell ™fully supported devices.

Parameters:

device The identifier of the target device

link Specifies the NvLink link to be queried

capability Specifies the *nvmlNvLinkCapability_t* to be queried

capResult A boolean for the queried capability indicating that feature is available

Returns:

- NVML_SUCCESS if *capResult* has been set
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *device*, *link*, or *capability* is invalid or *capResult* is NULL
- NVML_ERROR_NOT_SUPPORTED if the device doesn't support this feature
- NVML_ERROR_UNKNOWN on any unexpected error

6.14.2.3 nvmlReturn_t DECLDIR nvmlDeviceGetNvLinkErrorCounter (nvmlDevice_t *device*, unsigned int *link*, nvmlNvLinkErrorCounter_t *counter*, unsigned long long * *counterValue*)

Retrieves the specified error counter value Please refer to *nvmlNvLinkErrorCounter_t* for error counters that are available

For newer than Maxwell ™fully supported devices.

Parameters:

device The identifier of the target device

link Specifies the NvLink link to be queried

counter Specifies the NvLink counter to be queried

counterValue Returned counter value

Returns:

- NVML_SUCCESS if *counter* has been set
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *device*, *link*, or *counter* is invalid or *counterValue* is NULL
- NVML_ERROR_NOT_SUPPORTED if the device doesn't support this feature
- NVML_ERROR_UNKNOWN on any unexpected error

6.14.2.4 nvmlReturn_t DECLDIR nvmlDeviceGetNvLinkRemotePciInfo (nvmlDevice_t *device*, unsigned int *link*, nvmlPciInfo_t * *pci*)

Retrieves the PCI information for the remote node on a NvLink link Note: pciSubSystemId is not filled in this function and is indeterminate

For newer than Maxwell ™fully supported devices.

Parameters:

device The identifier of the target device

link Specifies the NvLink link to be queried

pci *nvmlPciInfo_t* of the remote node for the specified link

Returns:

- NVML_SUCCESS if *pci* has been set
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *device* or *link* is invalid or *pci* is NULL
- NVML_ERROR_NOT_SUPPORTED if the device doesn't support this feature
- NVML_ERROR_UNKNOWN on any unexpected error

6.14.2.5 nvmlReturn_t DECLDIR nvmlDeviceGetNvLinkState (nvmlDevice_t *device*, unsigned int *link*, nvmlEnableState_t * *isActive*)

Retrieves the state of the device's NvLink for the link specified

For newer than Maxwell ™fully supported devices.

Parameters:

device The identifier of the target device

link Specifies the NvLink link to be queried

isActive *nvmlEnableState_t* where NVML_FEATURE_ENABLED indicates that the link is active and NVML_FEATURE_DISABLED indicates it is inactive

Returns:

- NVML_SUCCESS if *isActive* has been set
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *device* or *link* is invalid or *isActive* is NULL
- NVML_ERROR_NOT_SUPPORTED if the device doesn't support this feature
- NVML_ERROR_UNKNOWN on any unexpected error

6.14.2.6 nvmlReturn_t DECLDIR nvmlDeviceGetNvLinkUtilizationControl (nvmlDevice_t *device*, unsigned int *link*, unsigned int *counter*, nvmlNvLinkUtilizationControl_t * *control*)

Get the NVLINK utilization counter control information for the specified counter, 0 or 1. Please refer to *nvmlNvLinkUtilizationControl_t* for the structure definition

For newer than Maxwell ™fully supported devices.

Parameters:

device The identifier of the target device

counter Specifies the counter that should be set (0 or 1).

link Specifies the NvLink link to be queried

control A reference to the *nvmlNvLinkUtilizationControl_t* to place information

Returns:

- NVML_SUCCESS if the control has been set successfully
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *device*, *counter*, *link*, or *control* is invalid
- NVML_ERROR_NOT_SUPPORTED if the device doesn't support this feature
- NVML_ERROR_UNKNOWN on any unexpected error

6.14.2.7 nvmlReturn_t DECLDIR nvmlDeviceGetNvLinkUtilizationCounter (nvmlDevice_t *device*, unsigned int *link*, unsigned int *counter*, unsigned long long * *rxcounter*, unsigned long long * *txcounter*)

Retrieve the NVLINK utilization counter based on the current control for a specified counter. In general it is good practice to use *nvmlDeviceSetNvLinkUtilizationControl* before reading the utilization counters as they have no default state

For newer than Maxwell ™fully supported devices.

Parameters:

device The identifier of the target device

link Specifies the NvLink link to be queried

counter Specifies the counter that should be read (0 or 1).

rxcounter Receive counter return value

txcounter Transmit counter return value

Returns:

- NVML_SUCCESS if *rxcounter* and *txcounter* have been successfully set
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *device*, *counter*, or *link* is invalid or *rxcounter* or *txcounter* are NULL
- NVML_ERROR_NOT_SUPPORTED if the device doesn't support this feature
- NVML_ERROR_UNKNOWN on any unexpected error

6.14.2.8 nvmlReturn_t DECLDIR nvmlDeviceGetNvLinkVersion (nvmlDevice_t *device*, unsigned int *link*, unsigned int * *version*)

Retrieves the version of the device's NvLink for the link specified

For newer than Maxwell ™fully supported devices.

Parameters:

device The identifier of the target device

link Specifies the NvLink link to be queried

version Requested NvLink version

Returns:

- NVML_SUCCESS if *version* has been set
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *device* or *link* is invalid or *version* is NULL
- NVML_ERROR_NOT_SUPPORTED if the device doesn't support this feature
- NVML_ERROR_UNKNOWN on any unexpected error

6.14.2.9 nvmlReturn_t DECLDIR nvmlDeviceResetNvLinkErrorCounters (nvmlDevice_t *device*, unsigned int *link*)

Resets all error counters to zero Please refer to *nvmlNvLinkErrorCounter_t* for the list of error counters that are reset

For newer than Maxwell ™fully supported devices.

Parameters:

device The identifier of the target device

link Specifies the NvLink link to be queried

Returns:

- NVML_SUCCESS if the reset is successful
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *device* or *link* is invalid
- NVML_ERROR_NOT_SUPPORTED if the device doesn't support this feature
- NVML_ERROR_UNKNOWN on any unexpected error

6.14.2.10 nvmlReturn_t DECLDIR nvmlDeviceResetNvLinkUtilizationCounter (nvmlDevice_t *device*, unsigned int *link*, unsigned int *counter*)

Reset the NVLINK utilization counters Both the receive and transmit counters are operated on by this function

For newer than Maxwell ™fully supported devices.

Parameters:

device The identifier of the target device

link Specifies the NvLink link to be reset

counter Specifies the counter that should be reset (0 or 1)

Returns:

- NVML_SUCCESS if counters were successfully reset
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *device*, *link*, or *counter* is invalid
- NVML_ERROR_NOT_SUPPORTED if the device doesn't support this feature
- NVML_ERROR_UNKNOWN on any unexpected error

6.14.2.11 nvmlReturn_t DECLDIR nvmlDeviceSetNvLinkUtilizationControl (nvmlDevice_t *device*, unsigned int *link*, unsigned int *counter*, nvmlNvLinkUtilizationControl_t * *control*, unsigned int *reset*)

Set the NVLINK utilization counter control information for the specified counter, 0 or 1. Please refer to *nvmlNvLinkUtilizationControl_t* for the structure definition. Performs a reset of the counters if the reset parameter is non-zero.

For newer than Maxwell ™fully supported devices.

Parameters:

device The identifier of the target device

counter Specifies the counter that should be set (0 or 1).

link Specifies the NvLink link to be queried

control A reference to the *nvmlNvLinkUtilizationControl_t* to set

reset Resets the counters on set if non-zero

Returns:

- NVML_SUCCESS if the control has been set successfully
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *device*, *counter*, *link*, or *control* is invalid
- NVML_ERROR_NOT_SUPPORTED if the device doesn't support this feature
- NVML_ERROR_UNKNOWN on any unexpected error

6.15 Event Handling Methods

Data Structures

- struct nvmlEventData_t

Modules

- Event Types

Typedefs

- typedef struct nvmlEventSet_st * nvmlEventSet_t

Functions

- nvmlReturn_t DECLDIR nvmlEventSetCreate (nvmlEventSet_t *set)
- nvmlReturn_t DECLDIR nvmlDeviceRegisterEvents (nvmlDevice_t device, unsigned long long eventTypes, nvmlEventSet_t set)
- nvmlReturn_t DECLDIR nvmlDeviceGetSupportedEventTypes (nvmlDevice_t device, unsigned long long *eventTypes)
- nvmlReturn_t DECLDIR nvmlEventSetWait (nvmlEventSet_t set, nvmlEventData_t *data, unsigned int timeoutms)
- nvmlReturn_t DECLDIR nvmlEventSetFree (nvmlEventSet_t set)

6.15.1 Detailed Description

This chapter describes methods that NVML can perform against each device to register and wait for some event to occur.

6.15.2 Typedef Documentation

6.15.2.1 typedef struct nvmlEventSet_st* nvmlEventSet_t

Handle to an event set

6.15.3 Function Documentation

6.15.3.1 nvmlReturn_t DECLDIR nvmlDeviceGetSupportedEventTypes (nvmlDevice_t *device*, unsigned long long * *eventTypes*)

Returns information about events supported on device

For Fermi ™or newer fully supported devices.

Events are not supported on Windows. So this function returns an empty mask in *eventTypes* on Windows.

Parameters:

device The identifier of the target device

eventTypes Reference in which to return bitmask of supported events

Returns:

- NVML_SUCCESS if the eventTypes has been set
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *eventType* is NULL
- NVML_ERROR_GPU_IS_LOST if the target GPU has fallen off the bus or is otherwise inaccessible
- NVML_ERROR_UNKNOWN on any unexpected error

See also:

Event Types
nvmlDeviceRegisterEvents

6.15.3.2 nvmlReturn_t DECLDIR nvmlDeviceRegisterEvents (nvmlDevice_t *device*, unsigned long long *eventTypes*, nvmlEventSet_t *set*)

Starts recording of events on a specified devices and add the events to specified nvmlEventSet_t

For Fermi ™or newer fully supported devices. Ecc events are available only on ECC enabled devices (see nvmlDeviceGetTotalEccErrors) Power capping events are available only on Power Management enabled devices (see nvmlDeviceGetPowerManagementMode)

For Linux only.

IMPORTANT: Operations on *set* are not thread safe

This call starts recording of events on specific device. All events that occurred before this call are not recorded. Checking if some event occurred can be done with nvmlEventSetWait

If function reports NVML_ERROR_UNKNOWN, event set is in undefined state and should be freed. If function reports NVML_ERROR_NOT_SUPPORTED, event set can still be used. None of the requested eventTypes are registered in that case.

Parameters:

device The identifier of the target device

eventTypes Bitmask of Event Types to record

set Set to which add new event types

Returns:

- NVML_SUCCESS if the event has been set
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *eventTypes* is invalid or *set* is NULL
- NVML_ERROR_NOT_SUPPORTED if the platform does not support this feature or some of requested event types
- NVML_ERROR_GPU_IS_LOST if the target GPU has fallen off the bus or is otherwise inaccessible
- NVML_ERROR_UNKNOWN on any unexpected error

See also:

Event Types
nvmlDeviceGetSupportedEventTypes
nvmlEventSetWait
nvmlEventSetFree

6.15.3.3 nvmlReturn_t DECLDIR nvmlEventSetCreate (nvmlEventSet_t * *set*)

Create an empty set of events. Event set should be freed by nvmlEventSetFree

For Fermi ™or newer fully supported devices.

Parameters:

set Reference in which to return the event handle

Returns:

- NVML_SUCCESS if the event has been set
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *set* is NULL
- NVML_ERROR_UNKNOWN on any unexpected error

See also:

nvmlEventSetFree

6.15.3.4 nvmlReturn_t DECLDIR nvmlEventSetFree (nvmlEventSet_t *set*)

Releases events in the set

For Fermi ™or newer fully supported devices.

Parameters:

set Reference to events to be released

Returns:

- NVML_SUCCESS if the event has been successfully released
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_UNKNOWN on any unexpected error

See also:

nvmlDeviceRegisterEvents

6.15.3.5 nvmlReturn_t DECLDIR nvmlEventSetWait (nvmlEventSet_t *set*, nvmlEventData_t * *data*, unsigned int *timeoutms*)

Waits on events and delivers events

For Fermi ™or newer fully supported devices.

If some events are ready to be delivered at the time of the call, function returns immediately. If there are no events ready to be delivered, function sleeps till event arrives but not longer than specified timeout. This function in certain conditions can return before specified timeout passes (e.g. when interrupt arrives)

In case of xid error, the function returns the most recent xid error type seen by the system. If there are multiple xid errors generated before nvmlEventSetWait is invoked then the last seen xid error type is returned for all xid error events.

Parameters:

set Reference to set of events to wait on

data Reference in which to return event data

timeoutms Maximum amount of wait time in milliseconds for registered event

Returns:

- NVML_SUCCESS if the data has been set
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *data* is NULL
- NVML_ERROR_TIMEOUT if no event arrived in specified timeout or interrupt arrived
- NVML_ERROR_GPU_IS_LOST if a GPU has fallen off the bus or is otherwise inaccessible
- NVML_ERROR_UNKNOWN on any unexpected error

See also:

Event Types
nvmlDeviceRegisterEvents

6.16 Drain states

Functions

- nvmlReturn_t DECLDIR nvmlDeviceModifyDrainState (unsigned int nvmlIndex, nvmlEnableState_t newState)
- nvmlReturn_t DECLDIR nvmlDeviceQueryDrainState (unsigned int nvmlIndex, nvmlEnableState_t *currentState)
- nvmlReturn_t DECLDIR nvmlDeviceRemoveGpu (unsigned int nvmlIndex)
- nvmlReturn_t DECLDIR nvmlDeviceDiscoverGpus (nvmlPciInfo_t *pciInfo)

6.16.1 Detailed Description

This chapter describes methods that NVML can perform against each device to control their drain state and recognition by NVML and NVIDIA kernel driver. These methods can be used with out-of-band tools to power on/off GPUs, enable robust reset scenarios, etc.

6.16.2 Function Documentation

6.16.2.1 nvmlReturn_t DECLDIR nvmlDeviceDiscoverGpus (nvmlPciInfo_t * *pciInfo*)

Request the OS and the NVIDIA kernel driver to rediscover a portion of the PCI subsystem looking for GPUs that were previously removed. The portion of the PCI tree can be narrowed by specifying a domain, bus, and device. If all are zeroes then the entire PCI tree will be searched. Please note that for long-running NVML processes the enumeration will change based on how many GPUs are discovered and where they are inserted in bus order.

In addition, all newly discovered GPUs will be initialized and their ECC scrubbed which may take several seconds per GPU. Also, all device handles are no longer guaranteed to be valid post discovery.

Must be run as administrator. For Linux only.

For newer than Maxwell ™fully supported devices. Some Kepler devices supported.

Parameters:

pciInfo The PCI tree to be searched. Only the domain, bus, and device fields are used in this call.

Returns:

- NVML_SUCCESS if counters were successfully reset
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *pciInfo* is invalid
- NVML_ERROR_NOT_SUPPORTED if the operating system does not support this feature
- NVML_ERROR_OPERATING_SYSTEM if the operating system is denying this feature
- NVML_ERROR_NO_PERMISSION if the calling process has insufficient permissions to perform operation
- NVML_ERROR_UNKNOWN on any unexpected error

6.16.2.2 nvmlReturn_t DECLDIR nvmlDeviceModifyDrainState (unsigned int *nvmlIndex*, nvmlEnableState_t *newState*)

Modify the drain state of a GPU. This method forces a GPU to no longer accept new incoming requests. Any new NVML process will see a gap in the enumeration where this GPU should exist as any call to that GPU outside of the drain state APIs will fail. Must be called as administrator. For Linux only.

For newer than Maxwell ™fully supported devices. Some Kepler devices supported.

Parameters:

nvmlIndex The ID of the target device

newState The drain state that should be entered, see nvmlEnableState_t

Returns:

- NVML_SUCCESS if counters were successfully reset
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *nvmlIndex* or *newState* is invalid
- NVML_ERROR_NOT_SUPPORTED if the device doesn't support this feature
- NVML_ERROR_NO_PERMISSION if the calling process has insufficient permissions to perform operation
- NVML_ERROR_UNKNOWN on any unexpected error

6.16.2.3 nvmlReturn_t DECLDIR nvmlDeviceQueryDrainState (unsigned int *nvmlIndex*, nvmlEnableState_t * *currentState*)

Query the drain state of a GPU. This method is used to check if a GPU is in a currently draining state. For Linux only.

For newer than Maxwell ™fully supported devices. Some Kepler devices supported.

Parameters:

nvmlIndex The ID of the target device

currentState The current drain state for this GPU, see nvmlEnableState_t

Returns:

- NVML_SUCCESS if counters were successfully reset
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *nvmlIndex* or *currentState* is invalid
- NVML_ERROR_NOT_SUPPORTED if the device doesn't support this feature
- NVML_ERROR_UNKNOWN on any unexpected error

6.16.2.4 nvmlReturn_t DECLDIR nvmlDeviceRemoveGpu (unsigned int *nvmlIndex*)

This method will remove the specified GPU from the view of both NVML and the NVIDIA kernel driver as long as no other processes are attached. If other processes are attached, this call will return NVML_ERROR_IN_USE and the GPU will be returned to its original "draining" state. Note: the only situation where a process can still be attached after nvmlDeviceModifyDrainState() is called to initiate the draining state is if that process was using, and is still using, a GPU before the call was made. Also note, persistence mode counts as an attachment to the GPU thus it must be disabled prior to this call.

For long-running NVML processes please note that this will change the enumeration of current GPUs. For example, if there are four GPUs present and GPU1 is removed, the new enumeration will be 0-2. Also, device handles after the removed GPU will not be valid and must be re-established. Must be run as administrator. For Linux only.

For newer than Maxwell ™fully supported devices. Some Kepler devices supported.

Parameters:

nvmlIndex The ID of the target device

Returns:

- NVML_SUCCESS if counters were successfully reset
- NVML_ERROR_UNINITIALIZED if the library has not been successfully initialized
- NVML_ERROR_INVALID_ARGUMENT if *nvmlIndex* is invalid
- NVML_ERROR_NOT_SUPPORTED if the device doesn't support this feature
- NVML_ERROR_IN_USE if the device is still in use and cannot be removed

6.17 NvmlClocksThrottleReasons

Defines

- #define nvmlClocksThrottleReasonGpuIdle 0x0000000000000001LL
- #define nvmlClocksThrottleReasonApplicationsClocksSetting 0x0000000000000002LL
- #define nvmlClocksThrottleReasonUserDefinedClocks nvmlClocksThrottleReasonApplicationsClocksSetting
- #define nvmlClocksThrottleReasonSwPowerCap 0x0000000000000004LL
- #define nvmlClocksThrottleReasonHwSlowdown 0x0000000000000008LL
- #define nvmlClocksThrottleReasonSyncBoost 0x0000000000000010LL
- #define nvmlClocksThrottleReasonUnknown 0x8000000000000000LL
- #define nvmlClocksThrottleReasonNone 0x0000000000000000LL
- #define nvmlClocksThrottleReasonAll

6.17.1 Define Documentation

6.17.1.1 #define nvmlClocksThrottleReasonAll

Value:

```
(nvmlClocksThrottleReasonNone \
      | nvmlClocksThrottleReasonGpuIdle                        \
      | nvmlClocksThrottleReasonApplicationsClocksSetting      \
      | nvmlClocksThrottleReasonSwPowerCap                     \
      | nvmlClocksThrottleReasonHwSlowdown                     \
      | nvmlClocksThrottleReasonSyncBoost                      \
      | nvmlClocksThrottleReasonUnknown                        \
        )
```

Bit mask representing all supported clocks throttling reasons New reasons might be added to this list in the future

6.17.1.2 #define nvmlClocksThrottleReasonApplicationsClocksSetting 0x0000000000000002LL

GPU clocks are limited by current setting of applications clocks

See also:

nvmlDeviceSetApplicationsClocks
nvmlDeviceGetApplicationsClock

6.17.1.3 #define nvmlClocksThrottleReasonGpuIdle 0x0000000000000001LL

Nothing is running on the GPU and the clocks are dropping to Idle state

Note:

This limiter may be removed in a later release

6.17.1.4 #define nvmlClocksThrottleReasonHwSlowdown 0x0000000000000008LL

HW Slowdown (reducing the core clocks by a factor of 2 or more) is engaged

This is an indicator of:

- temperature being too high
- External Power Brake Assertion is triggered (e.g. by the system power supply)
- Power draw is too high and Fast Trigger protection is reducing the clocks
- May be also reported during PState or clock change
  - This behavior may be removed in a later release.

See also:

nvmlDeviceGetTemperature
nvmlDeviceGetTemperatureThreshold
nvmlDeviceGetPowerUsage

6.17.1.5 #define nvmlClocksThrottleReasonNone 0x0000000000000000LL

Bit mask representing no clocks throttling

Clocks are as high as possible.

6.17.1.6 #define nvmlClocksThrottleReasonSwPowerCap 0x0000000000000004LL

SW Power Scaling algorithm is reducing the clocks below requested clocks

See also:

nvmlDeviceGetPowerUsage
nvmlDeviceSetPowerManagementLimit
nvmlDeviceGetPowerManagementLimit

6.17.1.7 #define nvmlClocksThrottleReasonSyncBoost 0x0000000000000010LL

Sync Boost

This GPU has been added to a Sync boost group with nvidia-smi or DCGM in order to maximize performance per watt. All GPUs in the sync boost group will boost to the minimum possible clocks across the entire group. Look at the throttle reasons for other GPUs in the system to see why those GPUs are holding this one at lower clocks.

6.17.1.8 #define nvmlClocksThrottleReasonUnknown 0x8000000000000000LL

Some other unspecified factor is reducing the clocks

6.17.1.9 #define nvmlClocksThrottleReasonUserDefinedClocks nvmlClocksThrottleReasonApplicationsClocksSetting

Deprecated

Renamed to nvmlClocksThrottleReasonApplicationsClocksSetting as the name describes the situation more accurately.

Chapter 7

Data Structure Documentation

7.1 nvmlAccountingStats_t Struct Reference

`#include <nvml.h>`

Data Fields

- unsigned int gpuUtilization

  Percent of time over the process's lifetime during which one or more kernels was executing on the GPU. Utilization stats just like returned by nvmlDeviceGetUtilizationRates but for the life time of a process (not just the last sample period). Set to NVML_VALUE_NOT_AVAILABLE if nvmlDeviceGetUtilizationRates is not supported.

- unsigned int memoryUtilization

  Percent of time over the process's lifetime during which global (device) memory was being read or written. Set to NVML_VALUE_NOT_AVAILABLE if nvmlDeviceGetUtilizationRates is not supported.

- unsigned long long maxMemoryUsage

  Maximum total memory in bytes that was ever allocated by the process. Set to NVML_VALUE_NOT_AVAILABLE if nvmlProcessInfo_t->usedGpuMemory is not supported.

- unsigned long long time

  Amount of time in ms during which the compute context was active. The time is reported as 0 if < the process is not terminated.

- unsigned long long startTime

  CPU Timestamp in usec representing start time for the process.

- unsigned int isRunning

  Flag to represent if the process is running (1 for running, 0 for terminated).

- unsigned int reserved [5]

  Reserved for future use.

7.1.1 Detailed Description

Describes accounting statistics of a process.

7.2 nvmlBAR1Memory_t Struct Reference

```
#include <nvml.h>
```

Data Fields

- unsigned long long bar1Total

  Total BAR1 Memory (in bytes).

- unsigned long long bar1Free

  Unallocated BAR1 Memory (in bytes).

- unsigned long long bar1Used

  Allocated Used Memory (in bytes).

7.2.1 Detailed Description

BAR1 Memory allocation Information for a device

7.3 nvmlBridgeChipHierarchy_t Struct Reference

`#include <nvml.h>`

Data Fields

- unsigned char bridgeCount

  Number of Bridge Chips on the Board.

- nvmlBridgeChipInfo_t bridgeChipInfo [NVML_MAX_PHYSICAL_BRIDGE]

  Hierarchy of Bridge Chips on the board.

7.3.1 Detailed Description

This structure stores the complete Hierarchy of the Bridge Chip within the board. The immediate bridge is stored at index 0 of bridgeInfoList, parent to immediate bridge is at index 1 and so forth.

7.4 nvmlBridgeChipInfo_t Struct Reference

`#include <nvml.h>`

Data Fields

- nvmlBridgeChipType_t type
  Type of Bridge Chip.
- unsigned int fwVersion
  Firmware Version. 0=Version is unavailable.

7.4.1 Detailed Description

Information about the Bridge Chip Firmware

7.5 nvmlEccErrorCounts_t Struct Reference

`#include <nvml.h>`

Data Fields

- unsigned long long l1Cache
  L1 cache errors.
- unsigned long long l2Cache
  L2 cache errors.
- unsigned long long deviceMemory
  Device memory errors.
- unsigned long long registerFile
  Register file errors.

7.5.1 Detailed Description

Detailed ECC error counts for a device.

Deprecated

Different GPU families can have different memory error counters See nvmlDeviceGetMemoryErrorCounter

7.6 nvmlEventData_t Struct Reference

```
#include <nvml.h>
```

Data Fields

- nvmlDevice_t device

  Specific device where the event occurred.

- unsigned long long eventType

  Information about what specific event occurred.

- unsigned long long eventData

  Stores last XID error for the device in the event of nvmlEventTypeXidCriticalError,.

7.6.1 Detailed Description

Information about occurred event

7.7 nvmlHwbcEntry_t Struct Reference

`#include <nvml.h>`

7.7.1 Detailed Description

Description of HWBC entry

7.8 nvmlLedState_t Struct Reference

`#include <nvml.h>`

Data Fields

- char cause [256]

  If amber, a text description of the cause.

- nvmlLedColor_t color

  GREEN or AMBER.

7.8.1 Detailed Description

LED states for an S-class unit.

7.9 nvmlMemory_t Struct Reference

`#include <nvml.h>`

Data Fields

- unsigned long long total

  Total installed FB memory (in bytes).

- unsigned long long free

  Unallocated FB memory (in bytes).

- unsigned long long used

  Allocated FB memory (in bytes). Note that the driver/GPU always sets aside a small amount of memory for bookkeeping.

7.9.1 Detailed Description

Memory allocation information for a device.

7.10 nvmlNvLinkUtilizationControl_t Struct Reference

```
#include <nvml.h>
```

7.10.1 Detailed Description

Struct to define the NVLINK counter controls

7.11 nvmlPciInfo_t Struct Reference

`#include <nvml.h>`

Data Fields

- char busId [NVML_DEVICE_PCI_BUS_ID_BUFFER_SIZE]

  The tuple domain:bus:device.function PCI identifier (& NULL terminator).

- unsigned int domain

  The PCI domain on which the device's bus resides, 0 to 0xffff.

- unsigned int bus

  The bus on which the device resides, 0 to 0xff.

- unsigned int device

  The device's id on the bus, 0 to 31.

- unsigned int pciDeviceId

  The combined 16-bit device id and 16-bit vendor id.

- unsigned int pciSubSystemId

  The 32-bit Sub System Device ID.

7.11.1 Detailed Description

PCI information about a GPU device.

7.12 nvmlProcessInfo_t Struct Reference

`#include <nvml.h>`

Data Fields

- unsigned int pid

  Process ID.

- unsigned long long usedGpuMemory

  Amount of used GPU memory in bytes. Under WDDM, NVML_VALUE_NOT_AVAILABLE is always reported because Windows KMD manages all the memory and not the NVIDIA driver.

7.12.1 Detailed Description

Information about running compute processes on the GPU

7.13 nvmlPSUInfo_t Struct Reference

`#include <nvml.h>`

Data Fields

- char state [256]
  The power supply state.
- unsigned int current
  PSU current (A).
- unsigned int voltage
  PSU voltage (V).
- unsigned int power
  PSU power draw (W).

7.13.1 Detailed Description

Power usage information for an S-class unit. The power supply state is a human readable string that equals "Normal" or contains a combination of "Abnormal" plus one or more of the following:

- High voltage
- Fan failure
- Heatsink temperature
- Current limit
- Voltage below UV alarm threshold
- Low-voltage
- SI2C remote off command
- MOD_DISABLE input
- Short pin transition

7.14 nvmlSample_t Struct Reference

`#include <nvml.h>`

Data Fields

- unsigned long long timeStamp

  CPU Timestamp in microseconds.

- nvmlValue_t sampleValue

  Sample Value.

7.14.1 Detailed Description

Information for Sample

7.15 nvmlUnitFanInfo_t Struct Reference

`#include <nvml.h>`

Data Fields

- unsigned int speed

  Fan speed (RPM).

- nvmlFanState_t state

  Flag that indicates whether fan is working properly.

7.15.1 Detailed Description

Fan speed reading for a single fan in an S-class unit.

7.16 nvmlUnitFanSpeeds_t Struct Reference

`#include <nvml.h>`

Data Fields

- nvmlUnitFanInfo_t fans [24]

  Fan speed data for each fan.

- unsigned int count

  Number of fans in unit.

7.16.1 Detailed Description

Fan speed readings for an entire S-class unit.

7.17 nvmlUnitInfo_t Struct Reference

`#include <nvml.h>`

Data Fields

- char name [96]
  Product name.
- char id [96]
  Product identifier.
- char serial [96]
  Product serial number.
- char firmwareVersion [96]
  Firmware version.

7.17.1 Detailed Description

Static S-class unit info.

7.18 nvmlUtilization_t Struct Reference

`#include <nvml.h>`

Data Fields

- unsigned int gpu

  Percent of time over the past sample period during which one or more kernels was executing on the GPU.

- unsigned int memory

  Percent of time over the past sample period during which global (device) memory was being read or written.

7.18.1 Detailed Description

Utilization information for a device. Each sample period may be between 1 second and 1/6 second, depending on the product being queried.

7.19 nvmlValue_t Union Reference

`#include <nvml.h>`

Data Fields

- double dVal
  If the value is double.
- unsigned int uiVal
  If the value is unsigned int.
- unsigned long ulVal
  If the value is unsigned long.
- unsigned long long ullVal
  If the value is unsigned long long.

7.19.1 Detailed Description

Union to represent different types of Value

7.20 nvmlViolationTime_t Struct Reference

`#include <nvml.h>`

Data Fields

- unsigned long long referenceTime

  referenceTime represents CPU timestamp in microseconds

- unsigned long long violationTime

  violationTime in Nanoseconds

7.20.1 Detailed Description

Struct to hold perf policy violation status data

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