



# NVML API REFERENCE MANUAL

November 3, 2017

Version 390.00





# Contents

<b>1</b>	<b>Known issues in the current version of NVML library</b>	<b>1</b>
<b>2</b>	<b>Change log of NVML library</b>	<b>3</b>
2.1	Changes between NVML v346 Update and v349 . . . . .	4
2.2	Changes between NVML v340 Update and v346 . . . . .	4
2.3	Changes between NVML v331 Update and v340 . . . . .	4
2.4	Changes between NVML v5.319 Update and v331 . . . . .	5
2.5	Changes between NVML v5.319 RC and v5.319 Update . . . . .	5
2.6	Changes between NVML v4.304 and v5.319 RC . . . . .	5
2.7	Changes between NVML v4.304 RC and v4.304 Production . . . . .	6
2.8	Changes between NVML v3.295 and v4.304 RC . . . . .	6
2.9	Changes between NVML v2.285 and v3.295 . . . . .	7
2.10	Changes between NVML v1.0 and v2.285 . . . . .	7
<b>3</b>	<b>Deprecated List</b>	<b>9</b>
<b>4</b>	<b>Module Index</b>	<b>11</b>
4.1	Modules . . . . .	11
<b>5</b>	<b>Data Structure Index</b>	<b>13</b>
5.1	Data Structures . . . . .	13
<b>6</b>	<b>Module Documentation</b>	<b>15</b>
6.1	Device Structs . . . . .	15
6.1.1	Define Documentation . . . . .	16
6.1.1.1	NVML_DEVICE_PCI_BUS_ID_BUFFER_SIZE . . . . .	16
6.1.1.2	NVML_DEVICE_PCI_BUS_ID_BUFFER_V2_SIZE . . . . .	16
6.1.1.3	NVML_MAX_PHYSICAL_BRIDGE . . . . .	16
6.1.1.4	NVML_NVLINK_MAX_LINKS . . . . .	16
6.1.1.5	NVML_VALUE_NOT_AVAILABLE . . . . .	16

6.1.2	Enumeration Type Documentation	17
6.1.2.1	nvmlBridgeChipType_t	17
6.1.2.2	nvmlGpuTopologyLevel_t	17
6.1.2.3	nvmlNvLinkCapability_t	17
6.1.2.4	nvmlNvLinkErrorCounter_t	17
6.1.2.5	nvmlNvLinkUtilizationCountPktTypes_t	17
6.1.2.6	nvmlNvLinkUtilizationCountUnits_t	17
6.1.2.7	nvmlPcieUtilCounter_t	17
6.1.2.8	nvmlPerfPolicyType_t	17
6.1.2.9	nvmlSamplingType_t	18
6.1.2.10	nvmlValueType_t	18
6.2	Device Enums	19
6.2.1	Define Documentation	21
6.2.1.1	NVML_DOUBLE_BIT_ECC	21
6.2.1.2	NVML_SINGLE_BIT_ECC	21
6.2.1.3	nvmlEccBitType_t	22
6.2.2	Enumeration Type Documentation	22
6.2.2.1	nvmlBrandType_t	22
6.2.2.2	nvmlClockId_t	22
6.2.2.3	nvmlClockType_t	22
6.2.2.4	nvmlComputeMode_t	22
6.2.2.5	nvmlDriverModel_t	23
6.2.2.6	nvmlEccCounterType_t	23
6.2.2.7	nvmlEnableState_t	23
6.2.2.8	nvmlGpuOperationMode_t	23
6.2.2.9	nvmlInforomObject_t	24
6.2.2.10	nvmlMemoryErrorType_t	24
6.2.2.11	nvmlMemoryLocation_t	24
6.2.2.12	nvmlPageRetirementCause_t	24
6.2.2.13	nvmlPstates_t	25
6.2.2.14	nvmlRestrictedAPI_t	25
6.2.2.15	nvmlReturn_t	25
6.2.2.16	nvmlTemperatureSensors_t	26
6.2.2.17	nvmlTemperatureThresholds_t	26
6.3	GRID Enums	27
6.3.1	Enumeration Type Documentation	27
6.3.1.1	nvmlGpuVirtualizationMode_t	27

6.4	Field Value Enums	28
6.4.1	Define Documentation	33
6.4.1.1	NVML_FI_DEV_ECC_CURRENT	33
6.5	Unit Structs	34
6.5.1	Enumeration Type Documentation	34
6.5.1.1	nvmlFanState_t	34
6.5.1.2	nvmlLedColor_t	34
6.6	Event Types	35
6.6.1	Detailed Description	35
6.6.2	Define Documentation	35
6.6.2.1	nvmlEventTypeClock	35
6.6.2.2	nvmlEventTypeDoubleBitEccError	35
6.6.2.3	nvmlEventTypePState	36
6.6.2.4	nvmlEventTypeSingleBitEccError	36
6.7	Accounting Statistics	37
6.7.1	Detailed Description	37
6.7.2	Function Documentation	37
6.7.2.1	nvmlDeviceClearAccountingPids	37
6.7.2.2	nvmlDeviceGetAccountingBufferSize	38
6.7.2.3	nvmlDeviceGetAccountingMode	38
6.7.2.4	nvmlDeviceGetAccountingPids	39
6.7.2.5	nvmlDeviceGetAccountingStats	39
6.7.2.6	nvmlDeviceSetAccountingMode	40
6.8	Vgpu Constants	41
6.8.1	Define Documentation	41
6.8.1.1	NVML_GRID_LICENSE_BUFFER_SIZE	41
6.9	Vgpu Enum	42
6.9.1	Enumeration Type Documentation	42
6.9.1.1	nvmlVgpuVmIdType_t	42
6.10	Vgpu Structs	43
6.11	Encoder Structs	44
6.12	Initialization and Cleanup	45
6.12.1	Detailed Description	45
6.12.2	Function Documentation	45
6.12.2.1	nvmlInit	45
6.12.2.2	nvmlInitWithFlags	46
6.12.2.3	nvmlShutdown	46

6.13	Error reporting	47
6.13.1	Detailed Description	47
6.13.2	Function Documentation	47
6.13.2.1	nvmlErrorString	47
6.14	Constants	48
6.14.1	Define Documentation	48
6.14.1.1	NVML_DEVICE_INFOROM_VERSION_BUFFER_SIZE	48
6.14.1.2	NVML_DEVICE_NAME_BUFFER_SIZE	48
6.14.1.3	NVML_DEVICE_PART_NUMBER_BUFFER_SIZE	48
6.14.1.4	NVML_DEVICE_SERIAL_BUFFER_SIZE	48
6.14.1.5	NVML_DEVICE_UUID_BUFFER_SIZE	48
6.14.1.6	NVML_DEVICE_VBIOS_VERSION_BUFFER_SIZE	48
6.14.1.7	NVML_SYSTEM_DRIVER_VERSION_BUFFER_SIZE	48
6.14.1.8	NVML_SYSTEM_NVML_VERSION_BUFFER_SIZE	48
6.15	System Queries	49
6.15.1	Detailed Description	49
6.15.2	Function Documentation	49
6.15.2.1	nvmlSystemGetCudaDriverVersion	49
6.15.2.2	nvmlSystemGetDriverVersion	49
6.15.2.3	nvmlSystemGetNVMLVersion	50
6.15.2.4	nvmlSystemGetProcessName	50
6.16	Unit Queries	51
6.16.1	Detailed Description	51
6.16.2	Function Documentation	51
6.16.2.1	nvmlSystemGetHicVersion	51
6.16.2.2	nvmlUnitGetCount	51
6.16.2.3	nvmlUnitGetDevices	52
6.16.2.4	nvmlUnitGetFanSpeedInfo	52
6.16.2.5	nvmlUnitGetHandleByIndex	53
6.16.2.6	nvmlUnitGetLedState	53
6.16.2.7	nvmlUnitGetPsuInfo	53
6.16.2.8	nvmlUnitGetTemperature	54
6.16.2.9	nvmlUnitGetUnitInfo	54
6.17	Device Queries	55
6.17.1	Detailed Description	58
6.17.2	Function Documentation	58
6.17.2.1	nvmlDeviceClearCpuAffinity	58

---

6.17.2.2	<a href="#">nvmlDeviceGetAPIRestriction</a>	58
6.17.2.3	<a href="#">nvmlDeviceGetApplicationsClock</a>	59
6.17.2.4	<a href="#">nvmlDeviceGetAutoBoostedClocksEnabled</a>	59
6.17.2.5	<a href="#">nvmlDeviceGetBAR1MemoryInfo</a>	60
6.17.2.6	<a href="#">nvmlDeviceGetBoardId</a>	60
6.17.2.7	<a href="#">nvmlDeviceGetBoardPartNumber</a>	61
6.17.2.8	<a href="#">nvmlDeviceGetBrand</a>	61
6.17.2.9	<a href="#">nvmlDeviceGetBridgeChipInfo</a>	61
6.17.2.10	<a href="#">nvmlDeviceGetClock</a>	62
6.17.2.11	<a href="#">nvmlDeviceGetClockInfo</a>	62
6.17.2.12	<a href="#">nvmlDeviceGetComputeMode</a>	63
6.17.2.13	<a href="#">nvmlDeviceGetComputeRunningProcesses</a>	63
6.17.2.14	<a href="#">nvmlDeviceGetCount</a>	64
6.17.2.15	<a href="#">nvmlDeviceGetCpuAffinity</a>	64
6.17.2.16	<a href="#">nvmlDeviceGetCudaComputeCapability</a>	65
6.17.2.17	<a href="#">nvmlDeviceGetCurrentClocksThrottleReasons</a>	65
6.17.2.18	<a href="#">nvmlDeviceGetCurrPcieLinkGeneration</a>	66
6.17.2.19	<a href="#">nvmlDeviceGetCurrPcieLinkWidth</a>	66
6.17.2.20	<a href="#">nvmlDeviceGetDecoderUtilization</a>	67
6.17.2.21	<a href="#">nvmlDeviceGetDefaultApplicationsClock</a>	67
6.17.2.22	<a href="#">nvmlDeviceGetDetailedEccErrors</a>	68
6.17.2.23	<a href="#">nvmlDeviceGetDisplayActive</a>	69
6.17.2.24	<a href="#">nvmlDeviceGetDisplayMode</a>	69
6.17.2.25	<a href="#">nvmlDeviceGetDriverModel</a>	70
6.17.2.26	<a href="#">nvmlDeviceGetEccMode</a>	70
6.17.2.27	<a href="#">nvmlDeviceGetEncoderCapacity</a>	71
6.17.2.28	<a href="#">nvmlDeviceGetEncoderSessions</a>	71
6.17.2.29	<a href="#">nvmlDeviceGetEncoderStats</a>	72
6.17.2.30	<a href="#">nvmlDeviceGetEncoderUtilization</a>	72
6.17.2.31	<a href="#">nvmlDeviceGetEnforcedPowerLimit</a>	73
6.17.2.32	<a href="#">nvmlDeviceGetFanSpeed</a>	73
6.17.2.33	<a href="#">nvmlDeviceGetGpuOperationMode</a>	74
6.17.2.34	<a href="#">nvmlDeviceGetGraphicsRunningProcesses</a>	74
6.17.2.35	<a href="#">nvmlDeviceGetHandleByIndex</a>	75
6.17.2.36	<a href="#">nvmlDeviceGetHandleByPciBusId</a>	76
6.17.2.37	<a href="#">nvmlDeviceGetHandleBySerial</a>	77
6.17.2.38	<a href="#">nvmlDeviceGetHandleByUUID</a>	77

6.17.2.39 nvmlDeviceGetIndex	78
6.17.2.40 nvmlDeviceGetInforomConfigurationChecksum	79
6.17.2.41 nvmlDeviceGetInforomImageVersion	79
6.17.2.42 nvmlDeviceGetInforomVersion	80
6.17.2.43 nvmlDeviceGetMaxClockInfo	80
6.17.2.44 nvmlDeviceGetMaxCustomerBoostClock	81
6.17.2.45 nvmlDeviceGetMaxPcieLinkGeneration	81
6.17.2.46 nvmlDeviceGetMaxPcieLinkWidth	82
6.17.2.47 nvmlDeviceGetMemoryErrorCounter	82
6.17.2.48 nvmlDeviceGetMemoryInfo	83
6.17.2.49 nvmlDeviceGetMinorNumber	84
6.17.2.50 nvmlDeviceGetMultiGpuBoard	84
6.17.2.51 nvmlDeviceGetName	84
6.17.2.52 nvmlDeviceGetP2PStatus	85
6.17.2.53 nvmlDeviceGetPcieReplayCounter	85
6.17.2.54 nvmlDeviceGetPcieThroughput	86
6.17.2.55 nvmlDeviceGetPciInfo	86
6.17.2.56 nvmlDeviceGetPerformanceState	87
6.17.2.57 nvmlDeviceGetPersistenceMode	87
6.17.2.58 nvmlDeviceGetPowerManagementDefaultLimit	88
6.17.2.59 nvmlDeviceGetPowerManagementLimit	88
6.17.2.60 nvmlDeviceGetPowerManagementLimitConstraints	89
6.17.2.61 nvmlDeviceGetPowerManagementMode	89
6.17.2.62 nvmlDeviceGetPowerState	90
6.17.2.63 nvmlDeviceGetPowerUsage	90
6.17.2.64 nvmlDeviceGetRetiredPages	91
6.17.2.65 nvmlDeviceGetRetiredPagesPendingStatus	91
6.17.2.66 nvmlDeviceGetSamples	92
6.17.2.67 nvmlDeviceGetSerial	92
6.17.2.68 nvmlDeviceGetSupportedClocksThrottleReasons	93
6.17.2.69 nvmlDeviceGetSupportedGraphicsClocks	93
6.17.2.70 nvmlDeviceGetSupportedMemoryClocks	94
6.17.2.71 nvmlDeviceGetTemperature	95
6.17.2.72 nvmlDeviceGetTemperatureThreshold	95
6.17.2.73 nvmlDeviceGetTopologyCommonAncestor	96
6.17.2.74 nvmlDeviceGetTopologyNearestGpus	96
6.17.2.75 nvmlDeviceGetTotalEccErrors	96

6.17.2.76	<a href="#">nvmIDeviceGetTotalEnergyConsumption</a>	97
6.17.2.77	<a href="#">nvmIDeviceGetUtilizationRates</a>	98
6.17.2.78	<a href="#">nvmIDeviceGetUUID</a>	98
6.17.2.79	<a href="#">nvmIDeviceGetVbiosVersion</a>	99
6.17.2.80	<a href="#">nvmIDeviceGetViolationStatus</a>	99
6.17.2.81	<a href="#">nvmIDeviceOnSameBoard</a>	100
6.17.2.82	<a href="#">nvmIDeviceResetApplicationsClocks</a>	100
6.17.2.83	<a href="#">nvmIDeviceSetAutoBoostedClocksEnabled</a>	101
6.17.2.84	<a href="#">nvmIDeviceSetCpuAffinity</a>	101
6.17.2.85	<a href="#">nvmIDeviceSetDefaultAutoBoostedClocksEnabled</a>	102
6.17.2.86	<a href="#">nvmIDeviceValidateInforom</a>	102
6.17.2.87	<a href="#">nvmISystemGetTopologyGpuSet</a>	103
6.18	<a href="#">Unit Commands</a>	104
6.18.1	<a href="#">Detailed Description</a>	104
6.18.2	<a href="#">Function Documentation</a>	104
6.18.2.1	<a href="#">nvmIUnitSetLedState</a>	104
6.19	<a href="#">Device Commands</a>	105
6.19.1	<a href="#">Detailed Description</a>	105
6.19.2	<a href="#">Function Documentation</a>	105
6.19.2.1	<a href="#">nvmIDeviceClearEccErrorCounts</a>	105
6.19.2.2	<a href="#">nvmIDeviceSetAPIRestriction</a>	106
6.19.2.3	<a href="#">nvmIDeviceSetApplicationsClocks</a>	106
6.19.2.4	<a href="#">nvmIDeviceSetComputeMode</a>	107
6.19.2.5	<a href="#">nvmIDeviceSetDriverModel</a>	108
6.19.2.6	<a href="#">nvmIDeviceSetEccMode</a>	109
6.19.2.7	<a href="#">nvmIDeviceSetGpuOperationMode</a>	109
6.19.2.8	<a href="#">nvmIDeviceSetPersistenceMode</a>	110
6.19.2.9	<a href="#">nvmIDeviceSetPowerManagementLimit</a>	110
6.20	<a href="#">NvLink Methods</a>	112
6.20.1	<a href="#">Detailed Description</a>	112
6.20.2	<a href="#">Function Documentation</a>	112
6.20.2.1	<a href="#">nvmIDeviceFreezeNvLinkUtilizationCounter</a>	112
6.20.2.2	<a href="#">nvmIDeviceGetNvLinkCapability</a>	113
6.20.2.3	<a href="#">nvmIDeviceGetNvLinkErrorCounter</a>	113
6.20.2.4	<a href="#">nvmIDeviceGetNvLinkRemotePciInfo</a>	114
6.20.2.5	<a href="#">nvmIDeviceGetNvLinkState</a>	114
6.20.2.6	<a href="#">nvmIDeviceGetNvLinkUtilizationControl</a>	114

6.20.2.7	<code>nvmlDeviceGetNvLinkUtilizationCounter</code>	115
6.20.2.8	<code>nvmlDeviceGetNvLinkVersion</code>	115
6.20.2.9	<code>nvmlDeviceResetNvLinkErrorCounters</code>	116
6.20.2.10	<code>nvmlDeviceResetNvLinkUtilizationCounter</code>	116
6.20.2.11	<code>nvmlDeviceSetNvLinkUtilizationControl</code>	117
6.21	Event Handling Methods	118
6.21.1	Detailed Description	118
6.21.2	Typedef Documentation	118
6.21.2.1	<code>nvmlEventSet_t</code>	118
6.21.3	Function Documentation	118
6.21.3.1	<code>nvmlDeviceGetSupportedEventTypes</code>	118
6.21.3.2	<code>nvmlDeviceRegisterEvents</code>	119
6.21.3.3	<code>nvmlEventSetCreate</code>	120
6.21.3.4	<code>nvmlEventSetFree</code>	120
6.21.3.5	<code>nvmlEventSetWait</code>	120
6.22	Drain states	122
6.22.1	Detailed Description	122
6.22.2	Function Documentation	122
6.22.2.1	<code>nvmlDeviceDiscoverGpus</code>	122
6.22.2.2	<code>nvmlDeviceModifyDrainState</code>	122
6.22.2.3	<code>nvmlDeviceQueryDrainState</code>	123
6.22.2.4	<code>nvmlDeviceRemoveGpu</code>	123
6.23	Field Value Queries	125
6.23.1	Detailed Description	125
6.23.2	Function Documentation	125
6.23.2.1	<code>nvmlDeviceGetFieldValues</code>	125
6.24	Grid Queries	126
6.24.1	Detailed Description	126
6.24.2	Function Documentation	126
6.24.2.1	<code>nvmlDeviceGetVirtualizationMode</code>	126
6.25	Grid Commands	127
6.25.1	Detailed Description	127
6.25.2	Function Documentation	127
6.25.2.1	<code>nvmlDeviceSetVirtualizationMode</code>	127
6.26	vGPU Management	128
6.26.1	Detailed Description	129
6.26.2	Function Documentation	129

---

6.26.2.1	<a href="#">nvmIDeviceGetActiveVgpus</a>	129
6.26.2.2	<a href="#">nvmIDeviceGetCreatableVgpus</a>	129
6.26.2.3	<a href="#">nvmIDeviceGetGridLicensableFeatures</a>	130
6.26.2.4	<a href="#">nvmIDeviceGetProcessUtilization</a>	131
6.26.2.5	<a href="#">nvmIDeviceGetSupportedVgpus</a>	131
6.26.2.6	<a href="#">nvmIDeviceGetVgpuProcessUtilization</a>	132
6.26.2.7	<a href="#">nvmIDeviceGetVgpuUtilization</a>	133
6.26.2.8	<a href="#">nvmIVgpuInstanceGetEncoderCapacity</a>	134
6.26.2.9	<a href="#">nvmIVgpuInstanceGetEncoderSessions</a>	134
6.26.2.10	<a href="#">nvmIVgpuInstanceGetEncoderStats</a>	135
6.26.2.11	<a href="#">nvmIVgpuInstanceGetFbUsage</a>	135
6.26.2.12	<a href="#">nvmIVgpuInstanceGetFrameRateLimit</a>	136
6.26.2.13	<a href="#">nvmIVgpuInstanceGetLicenseStatus</a>	136
6.26.2.14	<a href="#">nvmIVgpuInstanceGetType</a>	136
6.26.2.15	<a href="#">nvmIVgpuInstanceGetUUID</a>	137
6.26.2.16	<a href="#">nvmIVgpuInstanceGetVmDriverVersion</a>	137
6.26.2.17	<a href="#">nvmIVgpuInstanceGetVmID</a>	138
6.26.2.18	<a href="#">nvmIVgpuInstanceSetEncoderCapacity</a>	138
6.26.2.19	<a href="#">nvmIVgpuTypeGetClass</a>	139
6.26.2.20	<a href="#">nvmIVgpuTypeGetDeviceID</a>	139
6.26.2.21	<a href="#">nvmIVgpuTypeGetFramebufferSize</a>	140
6.26.2.22	<a href="#">nvmIVgpuTypeGetFrameRateLimit</a>	140
6.26.2.23	<a href="#">nvmIVgpuTypeGetLicense</a>	140
6.26.2.24	<a href="#">nvmIVgpuTypeGetMaxInstances</a>	141
6.26.2.25	<a href="#">nvmIVgpuTypeGetName</a>	141
6.26.2.26	<a href="#">nvmIVgpuTypeGetNumDisplayHeads</a>	142
6.26.2.27	<a href="#">nvmIVgpuTypeGetResolution</a>	142
6.27	<a href="#">NvmIClocksThrottleReasons</a>	143
6.27.1	<a href="#">Define Documentation</a>	143
6.27.1.1	<a href="#">nvmIClocksThrottleReasonAll</a>	143
6.27.1.2	<a href="#">nvmIClocksThrottleReasonApplicationsClocksSetting</a>	143
6.27.1.3	<a href="#">nvmIClocksThrottleReasonGpuIdle</a>	143
6.27.1.4	<a href="#">nvmIClocksThrottleReasonHwPowerBrakeSlowdown</a>	144
6.27.1.5	<a href="#">nvmIClocksThrottleReasonHwSlowdown</a>	144
6.27.1.6	<a href="#">nvmIClocksThrottleReasonHwThermalSlowdown</a>	144
6.27.1.7	<a href="#">nvmIClocksThrottleReasonNone</a>	144
6.27.1.8	<a href="#">nvmIClocksThrottleReasonSwPowerCap</a>	145

6.27.1.9	<a href="#">nvmlClocksThrottleReasonSwThermalSlowdown</a>	145
6.27.1.10	<a href="#">nvmlClocksThrottleReasonSyncBoost</a>	145
6.27.1.11	<a href="#">nvmlClocksThrottleReasonUserDefinedClocks</a>	145
<b>7</b>	<b>Data Structure Documentation</b>	<b>147</b>
7.1	<a href="#">nvmlAccountingStats_t Struct Reference</a>	147
7.1.1	Detailed Description	148
7.2	<a href="#">nvmlBAR1Memory_t Struct Reference</a>	149
7.2.1	Detailed Description	149
7.3	<a href="#">nvmlBridgeChipHierarchy_t Struct Reference</a>	150
7.3.1	Detailed Description	150
7.4	<a href="#">nvmlBridgeChipInfo_t Struct Reference</a>	151
7.4.1	Detailed Description	151
7.5	<a href="#">nvmlEccErrorCounts_t Struct Reference</a>	152
7.5.1	Detailed Description	152
7.6	<a href="#">nvmlEventData_t Struct Reference</a>	153
7.6.1	Detailed Description	153
7.7	<a href="#">nvmlFieldValue_t Struct Reference</a>	154
7.7.1	Detailed Description	154
7.8	<a href="#">nvmlGridLicensableFeature_t Struct Reference</a>	155
7.8.1	Detailed Description	155
7.9	<a href="#">nvmlHwbcEntry_t Struct Reference</a>	156
7.9.1	Detailed Description	156
7.10	<a href="#">nvmlLedState_t Struct Reference</a>	157
7.10.1	Detailed Description	157
7.11	<a href="#">nvmlMemory_t Struct Reference</a>	158
7.11.1	Detailed Description	158
7.12	<a href="#">nvmlNvLinkUtilizationControl_t Struct Reference</a>	159
7.12.1	Detailed Description	159
7.13	<a href="#">nvmlPciInfo_t Struct Reference</a>	160
7.13.1	Detailed Description	160
7.14	<a href="#">nvmlProcessInfo_t Struct Reference</a>	161
7.14.1	Detailed Description	161
7.15	<a href="#">nvmlProcessUtilizationSample_t Struct Reference</a>	162
7.15.1	Detailed Description	162
7.16	<a href="#">nvmlPSUInfo_t Struct Reference</a>	163
7.16.1	Detailed Description	163

---

7.17	<a href="#">nvmlSample_t Struct Reference</a>	164
7.17.1	<a href="#">Detailed Description</a>	164
7.18	<a href="#">nvmlUnitFanInfo_t Struct Reference</a>	165
7.18.1	<a href="#">Detailed Description</a>	165
7.19	<a href="#">nvmlUnitFanSpeeds_t Struct Reference</a>	166
7.19.1	<a href="#">Detailed Description</a>	166
7.20	<a href="#">nvmlUnitInfo_t Struct Reference</a>	167
7.20.1	<a href="#">Detailed Description</a>	167
7.21	<a href="#">nvmlUtilization_t Struct Reference</a>	168
7.21.1	<a href="#">Detailed Description</a>	168
7.22	<a href="#">nvmlValue_t Union Reference</a>	169
7.22.1	<a href="#">Detailed Description</a>	169
7.23	<a href="#">nvmlVgpuInstanceUtilizationSample_t Struct Reference</a>	170
7.23.1	<a href="#">Detailed Description</a>	170
7.24	<a href="#">nvmlVgpuProcessUtilizationSample_t Struct Reference</a>	171
7.24.1	<a href="#">Detailed Description</a>	171
7.25	<a href="#">nvmlViolationTime_t Struct Reference</a>	172
7.25.1	<a href="#">Detailed Description</a>	172



# 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 [nvmlClocksThrottleReasonApplicationClocksSetting](#) as the name describes the situation more accurately.

# Chapter 4

## Module Index

### 4.1 Modules

Here is a list of all modules:

Device Structs . . . . .	15
Device Enums . . . . .	19
GRID Enums . . . . .	27
Field Value Enums . . . . .	28
Unit Structs . . . . .	34
Accounting Statistics . . . . .	37
Vgpu Constants . . . . .	41
Vgpu Enum . . . . .	42
Vgpu Structs . . . . .	43
Encoder Structs . . . . .	44
Initialization and Cleanup . . . . .	45
Error reporting . . . . .	47
Constants . . . . .	48
System Queries . . . . .	49
Unit Queries . . . . .	51
Device Queries . . . . .	55
Unit Commands . . . . .	104
Device Commands . . . . .	105
NvLink Methods . . . . .	112
Event Handling Methods . . . . .	118
Event Types . . . . .	35
Drain states . . . . .	122
Field Value Queries . . . . .	125
Grid Queries . . . . .	126
Grid Commands . . . . .	127
vGPU Management . . . . .	128
NvmlClocksThrottleReasons . . . . .	143



# Chapter 5

## Data Structure Index

### 5.1 Data Structures

Here are the data structures with brief descriptions:

<a href="#">nvmlAccountingStats_t</a>	147
<a href="#">nvmlBARIMemory_t</a>	149
<a href="#">nvmlBridgeChipHierarchy_t</a>	150
<a href="#">nvmlBridgeChipInfo_t</a>	151
<a href="#">nvmlEccErrorCounts_t</a>	152
<a href="#">nvmlEventData_t</a>	153
<a href="#">nvmlFieldValue_t</a>	154
<a href="#">nvmlGridLicensableFeature_t</a>	155
<a href="#">nvmlHwbcEntry_t</a>	156
<a href="#">nvmlLedState_t</a>	157
<a href="#">nvmlMemory_t</a>	158
<a href="#">nvmlNvLinkUtilizationControl_t</a>	159
<a href="#">nvmlPciInfo_t</a>	160
<a href="#">nvmlProcessInfo_t</a>	161
<a href="#">nvmlProcessUtilizationSample_t</a>	162
<a href="#">nvmlPSUInfo_t</a>	163
<a href="#">nvmlSample_t</a>	164
<a href="#">nvmlUnitFanInfo_t</a>	165
<a href="#">nvmlUnitFanSpeeds_t</a>	166
<a href="#">nvmlUnitInfo_t</a>	167
<a href="#">nvmlUtilization_t</a>	168
<a href="#">nvmlValue_t</a>	169
<a href="#">nvmlVgpuInstanceUtilizationSample_t</a>	170
<a href="#">nvmlVgpuProcessUtilizationSample_t</a>	171
<a href="#">nvmlViolationTime_t</a>	172



# 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](#) 32
- #define [NVML\\_DEVICE\\_PCI\\_BUS\\_ID\\_BUFFER\\_V2\\_SIZE](#) 16
- #define [NVML\\_NVLINK\\_MAX\\_LINKS](#) 6
- #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` {
  - `NVML_PERF_POLICY_POWER = 0,`
  - `NVML_PERF_POLICY_THERMAL = 1,`
  - `NVML_PERF_POLICY_SYNC_BOOST = 2,`
  - `NVML_PERF_POLICY_BOARD_LIMIT = 3,`
  - `NVML_PERF_POLICY_LOW_UTILIZATION = 4,`
  - `NVML_PERF_POLICY_RELIABILITY = 5,`
  - `NVML_PERF_POLICY_TOTAL_APP_CLOCKS = 10,`
  - `NVML_PERF_POLICY_TOTAL_BASE_CLOCKS = 11 }`

## 6.1.1 Define Documentation

### 6.1.1.1 `#define NVML_DEVICE_PCI_BUS_ID_BUFFER_SIZE 32`

Buffer size guaranteed to be large enough for pci bus id

### 6.1.1.2 `#define NVML_DEVICE_PCI_BUS_ID_BUFFER_V2_SIZE 16`

Buffer size guaranteed to be large enough for pci bus id for busIdLegacy

### 6.1.1.3 `#define NVML_MAX_PHYSICAL_BRIDGE (128)`

Maximum limit on Physical Bridges per Board

### 6.1.1.4 `#define NVML_NVLINK_MAX_LINKS 6`

Maximum number of NvLink links supported

### 6.1.1.5 `#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

#### Enumerator:

***NVML\_PERF\_POLICY\_POWER*** How long did power violations cause the GPU to be below application clocks.

***NVML\_PERF\_POLICY\_THERMAL*** How long did thermal violations cause the GPU to be below application clocks.

***NVML\_PERF\_POLICY\_SYNC\_BOOST*** How long did sync boost cause the GPU to be below application clocks.

***NVML\_PERF\_POLICY\_BOARD\_LIMIT*** How long did the board limit cause the GPU to be below application clocks.

***NVML\_PERF\_POLICY\_LOW\_UTILIZATION*** How long did low utilization cause the GPU to be below application clocks.

*NVML\_PERF\_POLICY\_RELIABILITY* How long did the board reliability limit cause the GPU to be below application clocks.

*NVML\_PERF\_POLICY\_TOTAL\_APP\_CLOCKS* Total time the GPU was held below application clocks by any limiter (0 - 5 above).

*NVML\_PERF\_POLICY\_TOTAL\_BASE\_CLOCKS* Total time the GPU was held below base clocks.

#### 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_MEMORY = 20,
NVML_ERROR_NO_DATA = 21,
NVML_ERROR_VGPU_ECC_NOT_SUPPORTED = 22,
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_TEXTURE_SHM = 5,
    NVML_MEMORY_LOCATION_CBU = 6,
    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\_TEXTURE\_SHM* Shared memory.
- NVML\_MEMORY\_LOCATION\_CBU* CBU.
- 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\_MEMORY*** Insufficient memory.
- NVML\_ERROR\_NO\_DATA*** No data.
- NVML\_ERROR\_VGPU\_ECC\_NOT\_SUPPORTED*** The requested vgpu operation is not available on target device, because ECC is enabled.
- 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 GRID Enums

### Enumerations

- enum `nvmlGpuVirtualizationMode_t` {  
    `NVML_GPU_VIRTUALIZATION_MODE_NONE` = 0,  
    `NVML_GPU_VIRTUALIZATION_MODE_PASSTHROUGH` = 1,  
    `NVML_GPU_VIRTUALIZATION_MODE_VGPU` = 2,  
    `NVML_GPU_VIRTUALIZATION_MODE_HOST_VGPU` = 3,  
    `NVML_GPU_VIRTUALIZATION_MODE_HOST_VSGA` = 4 }

### 6.3.1 Enumeration Type Documentation

#### 6.3.1.1 enum `nvmlGpuVirtualizationMode_t`

GPU virtualization mode types.

##### Enumerator:

*`NVML_GPU_VIRTUALIZATION_MODE_NONE`* Represents Bare Metal GPU.

*`NVML_GPU_VIRTUALIZATION_MODE_PASSTHROUGH`* Device is associated with GPU-Passthrough.

*`NVML_GPU_VIRTUALIZATION_MODE_VGPU`* Device is associated with vGPU inside virtual machine.

*`NVML_GPU_VIRTUALIZATION_MODE_HOST_VGPU`* Device is associated with VGX hypervisor in vGPU mode.

*`NVML_GPU_VIRTUALIZATION_MODE_HOST_VSGA`* Device is associated with VGX hypervisor in vSGA mode.

## 6.4 Field Value Enums

### Data Structures

- struct [nvmlFieldValue\\_t](#)

### Defines

- #define [NVML\\_FI\\_DEV\\_ECC\\_CURRENT](#) 1  
*Current ECC mode. 1=Active. 0=Inactive.*
- #define [NVML\\_FI\\_DEV\\_ECC\\_PENDING](#) 2  
*Pending ECC mode. 1=Active. 0=Inactive.*
- #define [NVML\\_FI\\_DEV\\_ECC\\_SBE\\_VOL\\_TOTAL](#) 3  
*Total single bit volatile ECC errors.*
- #define [NVML\\_FI\\_DEV\\_ECC\\_DBE\\_VOL\\_TOTAL](#) 4  
*Total double bit volatile ECC errors.*
- #define [NVML\\_FI\\_DEV\\_ECC\\_SBE\\_AGG\\_TOTAL](#) 5  
*Total single bit aggregate (persistent) ECC errors.*
- #define [NVML\\_FI\\_DEV\\_ECC\\_DBE\\_AGG\\_TOTAL](#) 6  
*Total double bit aggregate (persistent) ECC errors.*
- #define [NVML\\_FI\\_DEV\\_ECC\\_SBE\\_VOL\\_L1](#) 7  
*L1 cache single bit volatile ECC errors.*
- #define [NVML\\_FI\\_DEV\\_ECC\\_DBE\\_VOL\\_L1](#) 8  
*L1 cache double bit volatile ECC errors.*
- #define [NVML\\_FI\\_DEV\\_ECC\\_SBE\\_VOL\\_L2](#) 9  
*L2 cache single bit volatile ECC errors.*
- #define [NVML\\_FI\\_DEV\\_ECC\\_DBE\\_VOL\\_L2](#) 10  
*L2 cache double bit volatile ECC errors.*
- #define [NVML\\_FI\\_DEV\\_ECC\\_SBE\\_VOL\\_DEV](#) 11  
*Device memory single bit volatile ECC errors.*
- #define [NVML\\_FI\\_DEV\\_ECC\\_DBE\\_VOL\\_DEV](#) 12  
*Device memory double bit volatile ECC errors.*
- #define [NVML\\_FI\\_DEV\\_ECC\\_SBE\\_VOL\\_REG](#) 13  
*Register file single bit volatile ECC errors.*
- #define [NVML\\_FI\\_DEV\\_ECC\\_DBE\\_VOL\\_REG](#) 14  
*Register file double bit volatile ECC errors.*

- #define NVML\_FI\_DEV\_ECC\_SBE\_VOL\_TEX 15  
*Texture memory single bit volatile ECC errors.*
- #define NVML\_FI\_DEV\_ECC\_DBE\_VOL\_TEX 16  
*Texture memory double bit volatile ECC errors.*
- #define NVML\_FI\_DEV\_ECC\_DBE\_VOL\_CBU 17  
*CBU double bit volatile ECC errors.*
- #define NVML\_FI\_DEV\_ECC\_SBE\_AGG\_L1 18  
*L1 cache single bit aggregate (persistent) ECC errors.*
- #define NVML\_FI\_DEV\_ECC\_DBE\_AGG\_L1 19  
*L1 cache double bit aggregate (persistent) ECC errors.*
- #define NVML\_FI\_DEV\_ECC\_SBE\_AGG\_L2 20  
*L2 cache single bit aggregate (persistent) ECC errors.*
- #define NVML\_FI\_DEV\_ECC\_DBE\_AGG\_L2 21  
*L2 cache double bit aggregate (persistent) ECC errors.*
- #define NVML\_FI\_DEV\_ECC\_SBE\_AGG\_DEV 22  
*Device memory single bit aggregate (persistent) ECC errors.*
- #define NVML\_FI\_DEV\_ECC\_DBE\_AGG\_DEV 23  
*Device memory double bit aggregate (persistent) ECC errors.*
- #define NVML\_FI\_DEV\_ECC\_SBE\_AGG\_REG 24  
*Register File single bit aggregate (persistent) ECC errors.*
- #define NVML\_FI\_DEV\_ECC\_DBE\_AGG\_REG 25  
*Register File double bit aggregate (persistent) ECC errors.*
- #define NVML\_FI\_DEV\_ECC\_SBE\_AGG\_TEX 26  
*Texture memory single bit aggregate (persistent) ECC errors.*
- #define NVML\_FI\_DEV\_ECC\_DBE\_AGG\_TEX 27  
*Texture memory double bit aggregate (persistent) ECC errors.*
- #define NVML\_FI\_DEV\_ECC\_DBE\_AGG\_CBU 28  
*CBU double bit aggregate ECC errors.*
- #define NVML\_FI\_DEV\_RETIRED\_SBE 29  
*Number of retired pages because of single bit errors.*
- #define NVML\_FI\_DEV\_RETIRED\_DBE 30  
*Number of retired pages because of double bit errors.*
- #define NVML\_FI\_DEV\_RETIRED\_PENDING 31  
*If any pages are pending retirement. 1=yes. 0=no.*

- #define [NVML\\_FI\\_DEV\\_NVLINK\\_CRC\\_FLIT\\_ERROR\\_COUNT\\_L0](#) 32  
*NVLink flow control CRC Error Counter for Lane 0.*
- #define [NVML\\_FI\\_DEV\\_NVLINK\\_CRC\\_FLIT\\_ERROR\\_COUNT\\_L1](#) 33  
*NVLink flow control CRC Error Counter for Lane 1.*
- #define [NVML\\_FI\\_DEV\\_NVLINK\\_CRC\\_FLIT\\_ERROR\\_COUNT\\_L2](#) 34  
*NVLink flow control CRC Error Counter for Lane 2.*
- #define [NVML\\_FI\\_DEV\\_NVLINK\\_CRC\\_FLIT\\_ERROR\\_COUNT\\_L3](#) 35  
*NVLink flow control CRC Error Counter for Lane 3.*
- #define [NVML\\_FI\\_DEV\\_NVLINK\\_CRC\\_FLIT\\_ERROR\\_COUNT\\_L4](#) 36  
*NVLink flow control CRC Error Counter for Lane 4.*
- #define [NVML\\_FI\\_DEV\\_NVLINK\\_CRC\\_FLIT\\_ERROR\\_COUNT\\_L5](#) 37  
*NVLink flow control CRC Error Counter for Lane 5.*
- #define [NVML\\_FI\\_DEV\\_NVLINK\\_CRC\\_FLIT\\_ERROR\\_COUNT\\_TOTAL](#) 38  
*NVLink flow control CRC Error Counter total for all Lanes.*
- #define [NVML\\_FI\\_DEV\\_NVLINK\\_CRC\\_DATA\\_ERROR\\_COUNT\\_L0](#) 39  
*NVLink data CRC Error Counter for Lane 0.*
- #define [NVML\\_FI\\_DEV\\_NVLINK\\_CRC\\_DATA\\_ERROR\\_COUNT\\_L1](#) 40  
*NVLink data CRC Error Counter for Lane 1.*
- #define [NVML\\_FI\\_DEV\\_NVLINK\\_CRC\\_DATA\\_ERROR\\_COUNT\\_L2](#) 41  
*NVLink data CRC Error Counter for Lane 2.*
- #define [NVML\\_FI\\_DEV\\_NVLINK\\_CRC\\_DATA\\_ERROR\\_COUNT\\_L3](#) 42  
*NVLink data CRC Error Counter for Lane 3.*
- #define [NVML\\_FI\\_DEV\\_NVLINK\\_CRC\\_DATA\\_ERROR\\_COUNT\\_L4](#) 43  
*NVLink data CRC Error Counter for Lane 4.*
- #define [NVML\\_FI\\_DEV\\_NVLINK\\_CRC\\_DATA\\_ERROR\\_COUNT\\_L5](#) 44  
*NVLink data CRC Error Counter for Lane 5.*
- #define [NVML\\_FI\\_DEV\\_NVLINK\\_CRC\\_DATA\\_ERROR\\_COUNT\\_TOTAL](#) 45  
*NvLink data CRC Error Counter total for all Lanes.*
- #define [NVML\\_FI\\_DEV\\_NVLINK\\_REPLAY\\_ERROR\\_COUNT\\_L0](#) 46  
*NVLink Replay Error Counter for Lane 0.*
- #define [NVML\\_FI\\_DEV\\_NVLINK\\_REPLAY\\_ERROR\\_COUNT\\_L1](#) 47  
*NVLink Replay Error Counter for Lane 1.*
- #define [NVML\\_FI\\_DEV\\_NVLINK\\_REPLAY\\_ERROR\\_COUNT\\_L2](#) 48

*NVLink Replay Error Counter for Lane 2.*

- #define [NVML\\_FI\\_DEV\\_NVLINK\\_REPLAY\\_ERROR\\_COUNT\\_L3](#) 49  
*NVLink Replay Error Counter for Lane 3.*
- #define [NVML\\_FI\\_DEV\\_NVLINK\\_REPLAY\\_ERROR\\_COUNT\\_L4](#) 50  
*NVLink Replay Error Counter for Lane 4.*
- #define [NVML\\_FI\\_DEV\\_NVLINK\\_REPLAY\\_ERROR\\_COUNT\\_L5](#) 51  
*NVLink Replay Error Counter for Lane 5.*
- #define [NVML\\_FI\\_DEV\\_NVLINK\\_REPLAY\\_ERROR\\_COUNT\\_TOTAL](#) 52  
*NVLink Replay Error Counter total for all Lanes.*
- #define [NVML\\_FI\\_DEV\\_NVLINK\\_RECOVERY\\_ERROR\\_COUNT\\_L0](#) 53  
*NVLink Recovery Error Counter for Lane 0.*
- #define [NVML\\_FI\\_DEV\\_NVLINK\\_RECOVERY\\_ERROR\\_COUNT\\_L1](#) 54  
*NVLink Recovery Error Counter for Lane 1.*
- #define [NVML\\_FI\\_DEV\\_NVLINK\\_RECOVERY\\_ERROR\\_COUNT\\_L2](#) 55  
*NVLink Recovery Error Counter for Lane 2.*
- #define [NVML\\_FI\\_DEV\\_NVLINK\\_RECOVERY\\_ERROR\\_COUNT\\_L3](#) 56  
*NVLink Recovery Error Counter for Lane 3.*
- #define [NVML\\_FI\\_DEV\\_NVLINK\\_RECOVERY\\_ERROR\\_COUNT\\_L4](#) 57  
*NVLink Recovery Error Counter for Lane 4.*
- #define [NVML\\_FI\\_DEV\\_NVLINK\\_RECOVERY\\_ERROR\\_COUNT\\_L5](#) 58  
*NVLink Recovery Error Counter for Lane 5.*
- #define [NVML\\_FI\\_DEV\\_NVLINK\\_RECOVERY\\_ERROR\\_COUNT\\_TOTAL](#) 59  
*NVLink Recovery Error Counter total for all Lanes.*
- #define [NVML\\_FI\\_DEV\\_NVLINK\\_BANDWIDTH\\_C0\\_L0](#) 60  
*NVLink Bandwidth Counter for Counter Set 0, Lane 0.*
- #define [NVML\\_FI\\_DEV\\_NVLINK\\_BANDWIDTH\\_C0\\_L1](#) 61  
*NVLink Bandwidth Counter for Counter Set 0, Lane 1.*
- #define [NVML\\_FI\\_DEV\\_NVLINK\\_BANDWIDTH\\_C0\\_L2](#) 62  
*NVLink Bandwidth Counter for Counter Set 0, Lane 2.*
- #define [NVML\\_FI\\_DEV\\_NVLINK\\_BANDWIDTH\\_C0\\_L3](#) 63  
*NVLink Bandwidth Counter for Counter Set 0, Lane 3.*
- #define [NVML\\_FI\\_DEV\\_NVLINK\\_BANDWIDTH\\_C0\\_L4](#) 64  
*NVLink Bandwidth Counter for Counter Set 0, Lane 4.*

- `#define NVML_FI_DEV_NVLINK_BANDWIDTH_C0_L5` 65  
*NVLink Bandwidth Counter for Counter Set 0, Lane 5.*
- `#define NVML_FI_DEV_NVLINK_BANDWIDTH_C0_TOTAL` 66  
*NVLink Bandwidth Counter Total for Counter Set 0, All Lanes.*
- `#define NVML_FI_DEV_NVLINK_BANDWIDTH_C1_L0` 67  
*NVLink Bandwidth Counter for Counter Set 1, Lane 0.*
- `#define NVML_FI_DEV_NVLINK_BANDWIDTH_C1_L1` 68  
*NVLink Bandwidth Counter for Counter Set 1, Lane 1.*
- `#define NVML_FI_DEV_NVLINK_BANDWIDTH_C1_L2` 69  
*NVLink Bandwidth Counter for Counter Set 1, Lane 2.*
- `#define NVML_FI_DEV_NVLINK_BANDWIDTH_C1_L3` 70  
*NVLink Bandwidth Counter for Counter Set 1, Lane 3.*
- `#define NVML_FI_DEV_NVLINK_BANDWIDTH_C1_L4` 71  
*NVLink Bandwidth Counter for Counter Set 1, Lane 4.*
- `#define NVML_FI_DEV_NVLINK_BANDWIDTH_C1_L5` 72  
*NVLink Bandwidth Counter for Counter Set 1, Lane 5.*
- `#define NVML_FI_DEV_NVLINK_BANDWIDTH_C1_TOTAL` 73  
*NVLink Bandwidth Counter Total for Counter Set 1, All Lanes.*
- `#define NVML_FI_DEV_PERF_POLICY_POWER` 74  
*Perf Policy Counter for Power Policy.*
- `#define NVML_FI_DEV_PERF_POLICY_THERMAL` 75  
*Perf Policy Counter for Thermal Policy.*
- `#define NVML_FI_DEV_PERF_POLICY_SYNC_BOOST` 76  
*Perf Policy Counter for Sync boost Policy.*
- `#define NVML_FI_DEV_PERF_POLICY_BOARD_LIMIT` 77  
*Perf Policy Counter for Board Limit.*
- `#define NVML_FI_DEV_PERF_POLICY_LOW_UTILIZATION` 78  
*Perf Policy Counter for Low GPU Utilization Policy.*
- `#define NVML_FI_DEV_PERF_POLICY_RELIABILITY` 79  
*Perf Policy Counter for Reliability Policy.*
- `#define NVML_FI_DEV_PERF_POLICY_TOTAL_APP_CLOCKS` 80  
*Perf Policy Counter for Total App Clock Policy.*
- `#define NVML_FI_DEV_PERF_POLICY_TOTAL_BASE_CLOCKS` 81  
*Perf Policy Counter for Total Base Clocks Policy.*

- #define `NVML_FI_DEV_MEMORY_TEMP` 82  
*Memory temperature for the device.*
- #define `NVML_FI_DEV_TOTAL_ENERGY_CONSUMPTION` 83  
*Total energy consumption for the GPU in mJ since the driver was last reloaded.*
- #define `NVML_FI_DEV_NVLINK_SPEED_MBPS_L0` 84  
*NVLink Speed in MBps for Link 0.*
- #define `NVML_FI_DEV_NVLINK_SPEED_MBPS_L1` 85  
*NVLink Speed in MBps for Link 1.*
- #define `NVML_FI_DEV_NVLINK_SPEED_MBPS_L2` 86  
*NVLink Speed in MBps for Link 2.*
- #define `NVML_FI_DEV_NVLINK_SPEED_MBPS_L3` 87  
*NVLink Speed in MBps for Link 3.*
- #define `NVML_FI_DEV_NVLINK_SPEED_MBPS_L4` 88  
*NVLink Speed in MBps for Link 4.*
- #define `NVML_FI_DEV_NVLINK_SPEED_MBPS_L5` 89  
*NVLink Speed in MBps for Link 5.*
- #define `NVML_FI_DEV_NVLINK_SPEED_MBPS_COMMON` 90  
*Common NVLink Speed in MBps for active links.*
- #define `NVML_FI_DEV_NVLINK_LINK_COUNT` 91  
*Number of NVLinks present on the device.*
- #define `NVML_FI_MAX` 92  
*One greater than the largest field ID defined above.*

## 6.4.1 Define Documentation

### 6.4.1.1 #define NVML\_FI\_DEV\_ECC\_CURRENT 1

Field Identifiers.

All Identifiers pertain to a device. Each ID is only used once and is guaranteed never to change.

## 6.5 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 }

#### 6.5.1 Enumeration Type Documentation

##### 6.5.1.1 enum `nvmlFanState_t`

Fan state enum.

###### Enumerator:

`NVML_FAN_NORMAL` Fan is working properly.

`NVML_FAN_FAILED` Fan has failed.

##### 6.5.1.2 enum `nvmlLedColor_t`

Led color enum.

###### Enumerator:

`NVML_LED_COLOR_GREEN` GREEN, indicates good health.

`NVML_LED_COLOR_AMBER` AMBER, indicates problem.

## 6.6 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.*

### 6.6.1 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](#)

### 6.6.2 Define Documentation

#### 6.6.2.1 #define nvmlEventTypeClock 0x0000000000000010LL

Kepler only

#### 6.6.2.2 #define nvmlEventTypeDoubleBitEccError 0x0000000000000002LL

#### Note:

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

**6.6.2.3 #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.

**6.6.2.4 #define nvmlEventTypeSingleBitEccError 0x0000000000000001LL****Note:**

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

## 6.7 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)

### 6.7.1 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.

### 6.7.2 Function Documentation

#### 6.7.2.1 [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

### 6.7.2.2 `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](#)

### 6.7.2.3 `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

#### 6.7.2.4 `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](#)

#### 6.7.2.5 `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](#)

### 6.7.2.6 `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

## 6.8 Vgpu Constants

### Defines

- `#define NVML_GRID_LICENSE_BUFFER_SIZE 128`

### 6.8.1 Define Documentation

#### 6.8.1.1 `#define NVML_GRID_LICENSE_BUFFER_SIZE 128`

Buffer size guaranteed to be large enough for [nvmlVgpuTypeGetLicense](#)

## 6.9 Vgpu Enum

### Enumerations

- enum `nvmlVgpuVmIdType_t` {  
    `NVML_VGPU_VM_ID_DOMAIN_ID` = 0,  
    `NVML_VGPU_VM_ID_UUID` = 1 }

### 6.9.1 Enumeration Type Documentation

#### 6.9.1.1 enum `nvmlVgpuVmIdType_t`

Types of VM identifiers

##### Enumerator:

*`NVML_VGPU_VM_ID_DOMAIN_ID`* VM ID represents DOMAIN ID.

*`NVML_VGPU_VM_ID_UUID`* VM ID represents UUID.

## 6.10 Vgpu Structs

### Data Structures

- struct [nvmlVgpuInstanceUtilizationSample\\_t](#)
- struct [nvmlVgpuProcessUtilizationSample\\_t](#)
- struct [nvmlProcessUtilizationSample\\_t](#)
- struct [nvmlGridLicensableFeature\\_t](#)

## 6.11 Encoder Structs

## 6.12 Initialization and Cleanup

### Defines

- `#define NVML_INIT_FLAG_NO_GPUS 1`  
*Don't fail `nvmlInit()` when no GPUs are found.*

### Functions

- `nvmlReturn_t DECLDIR nvmlInit (void)`
- `nvmlReturn_t DECLDIR nvmlInitWithFlags (unsigned int flags)`
- `nvmlReturn_t DECLDIR nvmlShutdown (void)`

#### 6.12.1 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.

#### 6.12.2 Function Documentation

##### 6.12.2.1 `nvmlReturn_t DECLDIR nvmlInit (void)`

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

#### Note:

`nvmlInit_v3` introduces a "flags" argument, that allows passing boolean values modifying the behaviour of `nvmlInit()`.

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.

#### Parameters:

*flags* behaviour modifier flags

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

### 6.12.2.2 `nvmlReturn_t DECLDIR nvmlInitWithFlags (unsigned int flags)`

`nvmlInitWithFlags` is a variant of `nvmlInit()`, that allows passing a set of boolean values modifying the behaviour of `nvmlInit()`. Other than the "flags" parameter it is completely similar to `nvmlInit`.

For all products.

#### Parameters:

*flags* behaviour modifier flags

#### 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

### 6.12.2.3 `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

## 6.13 Error reporting

### Functions

- `const DECLDIR char * nvmlErrorString (nvmlReturn\_t result)`

#### 6.13.1 Detailed Description

This chapter describes helper functions for error reporting routines.

#### 6.13.2 Function Documentation

##### 6.13.2.1 `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.

## 6.14 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`

### 6.14.1 Define Documentation

#### 6.14.1.1 `#define NVML_DEVICE_INFOROM_VERSION_BUFFER_SIZE 16`

Buffer size guaranteed to be large enough for [nvmlDeviceGetInforomVersion](#) and [nvmlDeviceGetInforomImageVersion](#)

#### 6.14.1.2 `#define NVML_DEVICE_NAME_BUFFER_SIZE 64`

Buffer size guaranteed to be large enough for [nvmlDeviceGetName](#)

#### 6.14.1.3 `#define NVML_DEVICE_PART_NUMBER_BUFFER_SIZE 80`

Buffer size guaranteed to be large enough for [nvmlDeviceGetBoardPartNumber](#)

#### 6.14.1.4 `#define NVML_DEVICE_SERIAL_BUFFER_SIZE 30`

Buffer size guaranteed to be large enough for [nvmlDeviceGetSerial](#)

#### 6.14.1.5 `#define NVML_DEVICE_UUID_BUFFER_SIZE 80`

Buffer size guaranteed to be large enough for [nvmlDeviceGetUUID](#)

#### 6.14.1.6 `#define NVML_DEVICE_VBIOS_VERSION_BUFFER_SIZE 32`

Buffer size guaranteed to be large enough for [nvmlDeviceGetVbiosVersion](#)

#### 6.14.1.7 `#define NVML_SYSTEM_DRIVER_VERSION_BUFFER_SIZE 80`

Buffer size guaranteed to be large enough for [nvmlSystemGetDriverVersion](#)

#### 6.14.1.8 `#define NVML_SYSTEM_NVML_VERSION_BUFFER_SIZE 80`

Buffer size guaranteed to be large enough for [nvmlSystemGetNVMLVersion](#)

## 6.15 System Queries

### Functions

- [nvmlReturn\\_t](#) DECLDIR [nvmlSystemGetDriverVersion](#) (char \*version, unsigned int length)
- [nvmlReturn\\_t](#) DECLDIR [nvmlSystemGetNVMLVersion](#) (char \*version, unsigned int length)
- [nvmlReturn\\_t](#) DECLDIR [nvmlSystemGetCudaDriverVersion](#) (int \*cudaDriverVersion)
- [nvmlReturn\\_t](#) DECLDIR [nvmlSystemGetProcessName](#) (unsigned int pid, char \*name, unsigned int length)

### 6.15.1 Detailed Description

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

### 6.15.2 Function Documentation

#### 6.15.2.1 [nvmlReturn\\_t](#) DECLDIR [nvmlSystemGetCudaDriverVersion](#) (int \* *cudaDriverVersion*)

Retrieves the version of the CUDA driver.

For all products.

The returned CUDA driver version is the same as the CUDA API `cuDriverGetVersion()` would return on the system.

#### Parameters:

*cudaDriverVersion* Reference in which to return the version identifier

#### Returns:

- [NVML\\_SUCCESS](#) if *cudaDriverVersion* has been set
- [NVML\\_ERROR\\_INVALID\\_ARGUMENT](#) if *cudaDriverVersion* is NULL

#### 6.15.2.2 [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

### 6.15.2.3 `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

### 6.15.2.4 `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 exist
- [NVML\\_ERROR\\_NO\\_PERMISSION](#) if the user doesn't have permission to perform this operation
- [NVML\\_ERROR\\_UNKNOWN](#) on any unexpected error

## 6.16 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)

### 6.16.1 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()`.

### 6.16.2 Function Documentation

#### 6.16.2.1 `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

#### 6.16.2.2 `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

### 6.16.2.3 `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

### 6.16.2.4 `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

**6.16.2.5 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,  $\geq 0$  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

**6.16.2.6 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\(\)](#)

**6.16.2.7 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

**6.16.2.8 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

**6.16.2.9 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

## 6.17 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 `nvmlDeviceGetP2PStatus` (`nvmlDevice_t` device1, `nvmlDevice_t` device2, `nvmlGpuP2PCapsIndex_t` p2pIndex, `nvmlGpuP2PStatus_t` \*p2pStatus)
- `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 [nvmlDeviceGetTotalEnergyConsumption](#) (nvmlDevice\_t device, unsigned long long \*energy)
- [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 [nvmlDeviceGetCudaComputeCapability](#) (nvmlDevice\_t device, int \*major, int \*minor)

- `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 `nvmlDeviceGetEncoderCapacity` (`nvmlDevice_t` device, `nvmlEncoderType_t` encoderQueryType, unsigned int \*encoderCapacity)
- `nvmlReturn_t` DECLDIR `nvmlDeviceGetEncoderStats` (`nvmlDevice_t` device, unsigned int \*sessionCount, unsigned int \*averageFps, unsigned int \*averageLatency)
- `nvmlReturn_t` DECLDIR `nvmlDeviceGetEncoderSessions` (`nvmlDevice_t` device, unsigned int \*sessionCount, `nvmlEncoderSessionInfo_t` \*sessionInfos)
- `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)

### 6.17.1 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\(\)](#).

### 6.17.2 Function Documentation

#### 6.17.2.1 `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

#### 6.17.2.2 `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](#)

### 6.17.2.3 `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

### 6.17.2.4 `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.

On Pascal and newer hardware, Auto Boosted clocks are controlled through application clocks. Use [nvmlDeviceSetApplicationsClocks](#) and [nvmlDeviceResetApplicationsClocks](#) to control Auto Boost behavior.

#### 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 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

### 6.17.2.5 `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 <sup>TM</sup> 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

### 6.17.2.6 `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 <sup>TM</sup> 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

### 6.17.2.7 `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

### 6.17.2.8 `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

### 6.17.2.9 `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

#### 6.17.2.10 `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 <sup>TM</sup> 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

#### 6.17.2.11 `nvmlReturn_t DECLDIR nvmlDeviceGetClockInfo (nvmlDevice_t device, nvmlClockType_t type, unsigned int * clock)`

Retrieves the current clock speeds for the device.

For Fermi <sup>TM</sup> 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

**6.17.2.12 `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\(\)](#)

**6.17.2.13 `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](#)

**6.17.2.14 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

**6.17.2.15 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

**6.17.2.16** `nvmlReturn_t DECLDIR nvmlDeviceGetCudaComputeCapability (nvmlDevice_t device, int * major, int * minor)`

Retrieves the CUDA compute capability of the device.

For all products.

Returns the major and minor compute capability version numbers of the device. The major and minor versions are equivalent to the `CU_DEVICE_ATTRIBUTE_COMPUTE_CAPABILITY_MINOR` and `CU_DEVICE_ATTRIBUTE_COMPUTE_CAPABILITY_MAJOR` attributes that would be returned by CUDA's `cuDeviceGetAttribute()`.

**Parameters:**

*device* The identifier of the target device

*major* Reference in which to return the major CUDA compute capability

*minor* Reference in which to return the minor CUDA compute capability

**Returns:**

- [NVML\\_SUCCESS](#) if *major* and *minor* have been set
- [NVML\\_ERROR\\_UNINITIALIZED](#) if the library has not been successfully initialized
- [NVML\\_ERROR\\_INVALID\\_ARGUMENT](#) if *device* is invalid or *major* or *minor* are 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

**6.17.2.17** `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](#)

#### 6.17.2.18 `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

#### 6.17.2.19 `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

### 6.17.2.20 `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

### 6.17.2.21 `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](#)

### 6.17.2.22 `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\(\)](#)

**6.17.2.23** `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

**6.17.2.24** `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

### 6.17.2.25 `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\(\)](#)

### 6.17.2.26 `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\(\)](#)

#### 6.17.2.27 `nvmlReturn_t DECLDIR nvmlDeviceGetEncoderCapacity (nvmlDevice_t device, nvmlEncoderType_t encoderQueryType, unsigned int * encoderCapacity)`

Retrieves the current capacity of the device's encoder, in macroblocks per second.

For Maxwell™ or newer fully supported devices.

##### Parameters:

*device* The identifier of the target device

*encoderQueryType* Type of encoder to query

*encoderCapacity* Reference to an unsigned int for the encoder capacity

##### Returns:

- [NVML\\_SUCCESS](#) if *encoderCapacity* is fetched
- [NVML\\_ERROR\\_UNINITIALIZED](#) if the library has not been successfully initialized
- [NVML\\_ERROR\\_INVALID\\_ARGUMENT](#) if *encoderCapacity* is NULL, or *device* or *encoderQueryType* are invalid
- [NVML\\_ERROR\\_NOT\\_SUPPORTED](#) if device does not support the encoder specified in *encoderQueryType*
- [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

#### 6.17.2.28 `nvmlReturn_t DECLDIR nvmlDeviceGetEncoderSessions (nvmlDevice_t device, unsigned int * sessionCount, nvmlEncoderSessionInfo_t * sessionInfos)`

Retrieves information about active encoder sessions on a target device.

An array of active encoder sessions is returned in the caller-supplied buffer pointed at by *sessionInfos*. The array element count is passed in *sessionCount*, and *sessionCount* is used to return the number of sessions written to the buffer.

If the supplied buffer is not large enough to accommodate the active session array, the function returns [NVML\\_ERROR\\_INSUFFICIENT\\_SIZE](#), with the element count of `nvmlEncoderSessionInfo_t` array required in *sessionCount*. To query the number of active encoder sessions, call this function with *\*sessionCount* = 0. The code will return [NVML\\_SUCCESS](#) with number of active encoder sessions updated in *\*sessionCount*.

For Maxwell™ or newer fully supported devices.

##### Parameters:

*device* The identifier of the target device

*sessionCount* Reference to caller supplied array size, and returns the number of sessions.

*sessionInfos* Reference in which to return the session information

**Returns:**

- [NVML\\_SUCCESS](#) if *sessionInfos* is fetched
- [NVML\\_ERROR\\_UNINITIALIZED](#) if the library has not been successfully initialized
- [NVML\\_ERROR\\_INSUFFICIENT\\_SIZE](#) if *sessionCount* is too small, array element count is returned in *sessionCount*
- [NVML\\_ERROR\\_INVALID\\_ARGUMENT](#) if *sessionCount* 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

**6.17.2.29** `nvmlReturn_t DECLDIR nvmlDeviceGetEncoderStats (nvmlDevice_t device, unsigned int * sessionCount, unsigned int * averageFps, unsigned int * averageLatency)`

Retrieves the current encoder statistics for a given device.

For Maxwell™ or newer fully supported devices.

**Parameters:**

*device* The identifier of the target device

*sessionCount* Reference to an unsigned int for count of active encoder sessions

*averageFps* Reference to an unsigned int for trailing average FPS of all active sessions

*averageLatency* Reference to an unsigned int for encode latency in microseconds

**Returns:**

- [NVML\\_SUCCESS](#) if *sessionCount*, *averageFps* and *averageLatency* is fetched
- [NVML\\_ERROR\\_UNINITIALIZED](#) if the library has not been successfully initialized
- [NVML\\_ERROR\\_INVALID\\_ARGUMENT](#) if *sessionCount*, or *device* or *averageFps*, or *averageLatency* 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

**6.17.2.30** `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

#### 6.17.2.31 `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

#### 6.17.2.32 `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

### 6.17.2.33 `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](#)

### 6.17.2.34 `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](#)

### 6.17.2.35 `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,  $\geq 0$  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](#)

### 6.17.2.36 `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

**6.17.2.37** `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`

**6.17.2.38** `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](#)

**6.17.2.39 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\(\)](#)

**6.17.2.40** `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

**6.17.2.41** `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](#)

#### 6.17.2.42 **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](#)

#### 6.17.2.43 **nvmlReturn\_t DECLDIR nvmlDeviceGetMaxClockInfo (nvmlDevice\_t device, nvmlClockType\_t type, unsigned int \* clock)**

Retrieves the maximum clock speeds for the device.

For Fermi <sup>TM</sup> 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

#### 6.17.2.44 `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 Pascal <sup>TM</sup> 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 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

#### 6.17.2.45 `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 <sup>TM</sup> 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

#### 6.17.2.46 `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

#### 6.17.2.47 `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*, *bitType*, *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

**6.17.2.48 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

### 6.17.2.49 `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

### 6.17.2.50 `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 <sup>TM</sup> 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

### 6.17.2.51 `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

**6.17.2.52** `nvmlReturn_t DECLDIR nvmlDeviceGetP2PStatus (nvmlDevice_t device1, nvmlDevice_t device2, nvmlGpuP2PCapsIndex_t p2pIndex, nvmlGpuP2PStatus_t * p2pStatus)`

Retrieve the status for a given p2p capability index between a given pair of GPU

**Parameters:**

- device1* The first device
- device2* The second device
- p2pIndex* p2p Capability Index being looked for between *device1* and *device2*
- p2pStatus* Reference in which to return the status of the *p2pIndex* between *device1* and *device2*

**Returns:**

- [NVML\\_SUCCESS](#) if *p2pStatus* has been populated
- [NVML\\_ERROR\\_INVALID\\_ARGUMENT](#) if *device1* or *device2* or *p2pIndex* is invalid or *p2pStatus* is NULL
- [NVML\\_ERROR\\_UNKNOWN](#) on any unexpected error

**6.17.2.53** `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

#### 6.17.2.54 `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 in virtual machines running virtual GPU (vGPU).

**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

#### 6.17.2.55 `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

**6.17.2.56** `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

**6.17.2.57** `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\(\)](#)

### 6.17.2.58 `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

### 6.17.2.59 `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

### 6.17.2.60 `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](#)

### 6.17.2.61 `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

#### 6.17.2.62 `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

#### 6.17.2.63 `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

### 6.17.2.64 `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

### 6.17.2.65 `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

**6.17.2.66** `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 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

**6.17.2.67** `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

#### 6.17.2.68 `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 in virtual machines running virtual GPU (vGPU).

**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](#)

#### 6.17.2.69 `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](#)

#### 6.17.2.70 `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](#)

**6.17.2.71** `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

**6.17.2.72** `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

### 6.17.2.73 `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

### 6.17.2.74 `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

### 6.17.2.75 `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\(\)](#)

**6.17.2.76 nvmlReturn\_t DECLDIR nvmlDeviceGetTotalEnergyConsumption (nvmlDevice\_t device, unsigned long long \* energy)**

Retrieves total energy consumption for this GPU in millijoules (mJ) since the driver was last reloaded

For newer than Pascal <sup>TM</sup>fully supported devices.

**Parameters:**

*device* The identifier of the target device

*energy* Reference in which to return the energy consumption information

**Returns:**

- [NVML\\_SUCCESS](#) if *energy* has been populated
- [NVML\\_ERROR\\_UNINITIALIZED](#) if the library has not been successfully initialized
- [NVML\\_ERROR\\_INVALID\\_ARGUMENT](#) if *device* is invalid or *energy* is NULL
- [NVML\\_ERROR\\_NOT\\_SUPPORTED](#) if the device does not support energy 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

### 6.17.2.77 `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

### 6.17.2.78 `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

**6.17.2.79** `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

**6.17.2.80** `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 trying 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

### 6.17.2.81 `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

### 6.17.2.82 `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 can be changed using [nvmlDeviceSetApplicationsClocks](#).

On Pascal and newer hardware, if clocks were previously locked with [nvmlDeviceSetApplicationsClocks](#), this call will unlock clocks. This returns clocks their default behavior of automatically boosting above base clocks as thermal limits allow.

#### 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

### 6.17.2.83 `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.

On Pascal and newer hardware, Auto Boosted clocks are controlled through application clocks. Use [nvmlDeviceSetApplicationsClocks](#) and [nvmlDeviceResetApplicationsClocks](#) to control Auto Boost behavior.

#### 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

### 6.17.2.84 `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

### 6.17.2.85 `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.

On Pascal and newer hardware, Auto Boosted clocks are controlled through application clocks. Use [nvmlDeviceSetApplicationsClocks](#) and [nvmlDeviceResetApplicationsClocks](#) to control Auto Boost behavior.

#### 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

### 6.17.2.86 `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

**6.17.2.87** `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

## 6.18 Unit Commands

### Functions

- [nvmlReturn\\_t](#) DECLDIR [nvmlUnitSetLedState](#) ([nvmlUnit\\_t](#) unit, [nvmlLedColor\\_t](#) color)

#### 6.18.1 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.

#### 6.18.2 Function Documentation

##### 6.18.2.1 [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\(\)](#)

## 6.19 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 mem-ClockMHz, 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)

### 6.19.1 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.

### 6.19.2 Function Documentation

#### 6.19.2.1 [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\(\)](#)

### 6.19.2.2 `nvmlReturn_t DECLDIR nvmlDeviceSetAPIRestriction (nvmlDevice_t device, nvmlRestrictedAPI_t apiType, nvmlEnableState_t isRestricted)`

Changes the root/admin restrictions 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](#)

### 6.19.2.3 `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.

On Pascal and newer hardware, this will automatically disable automatic boosting of clocks.

On K80 and newer Kepler and Maxwell GPUs, users desiring fixed performance should also call [nvmlDeviceSetAutoBoostedClocksEnabled](#) to prevent clocks from automatically boosting above the clock value being set.

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

**6.19.2.4 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\(\)](#)

### 6.19.2.5 `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\(\)](#)

### 6.19.2.6 `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()`

### 6.19.2.7 `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](#)

### 6.19.2.8 `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\(\)](#)

### 6.19.2.9 `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](#)

## 6.20 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)

### 6.20.1 Detailed Description

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

### 6.20.2 Function Documentation

#### 6.20.2.1 `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 Pascal <sup>TM</sup>or newer 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

### 6.20.2.2 `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 Pascal™ or newer 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

### 6.20.2.3 `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 Pascal™ or newer 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

#### 6.20.2.4 `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 Pascal™ or newer 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

#### 6.20.2.5 `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 Pascal™ or newer 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

#### 6.20.2.6 `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 Pascal™ or newer 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

### 6.20.2.7 `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 Pascal™ or newer 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

### 6.20.2.8 `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 Pascal™ or newer 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

**6.20.2.9 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 Pascal <sup>TM</sup>or newer 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

**6.20.2.10 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 Pascal <sup>TM</sup>or newer 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

**6.20.2.11 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 Pascal™ or newer 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

## 6.21 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 timeouts)
- [nvmlReturn\\_t](#) DECLDIR [nvmlEventSetFree](#) ([nvmlEventSet\\_t](#) set)

#### 6.21.1 Detailed Description

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

#### 6.21.2 Typedef Documentation

##### 6.21.2.1 typedef struct nvmlEventSet\_st\* nvmlEventSet\_t

Handle to an event set

#### 6.21.3 Function Documentation

##### 6.21.3.1 [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 *eventTypes* 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](#)

**6.21.3.2 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](#)

### 6.21.3.3 `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](#)

### 6.21.3.4 `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](#)

### 6.21.3.5 `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

*timeouts* 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](#)

## 6.22 Drain states

### Functions

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

### 6.22.1 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.

### 6.22.2 Function Documentation

#### 6.22.2.1 `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 Pascal <sup>™</sup>or newer 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

#### 6.22.2.2 `nvmlReturn_t DECLDIR nvmlDeviceModifyDrainState (nvmlPciInfo_t *pciInfo, 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 no longer see this GPU. Persistence mode for this GPU must be turned off before this call is made. Must be called as administrator. For Linux only.

For Pascal™ or newer fully supported devices. Some Kepler devices supported.

**Parameters:**

- pciInfo* The PCI address of the GPU drain state to be modified
- 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\\_IN\\_USE](#) if the device has persistence mode turned on
- [NVML\\_ERROR\\_UNKNOWN](#) on any unexpected error

**6.22.2.3 nvmlReturn\_t DECLDIR nvmlDeviceQueryDrainState (nvmlPciInfo\_t \* pciInfo, 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 Pascal™ or newer fully supported devices. Some Kepler devices supported.

**Parameters:**

- pciInfo* The PCI address of the GPU drain state to be queried
- 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

**6.22.2.4 nvmlReturn\_t DECLDIR nvmlDeviceRemoveGpu (nvmlPciInfo\_t \* pciInfo)**

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 Pascal™ or newer fully supported devices. Some Kepler devices supported.

**Parameters:**

*pciInfo* The PCI address of the GPU to be removed

**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

## 6.23 Field Value Queries

### Functions

- `nvmlReturn_t` DECLDIR `nvmlDeviceGetFieldValues` (`nvmlDevice_t` device, int valuesCount, `nvmlFieldValue_t` \*values)

#### 6.23.1 Detailed Description

This chapter describes NVML operations that are associated with retrieving Field Values from NVML

#### 6.23.2 Function Documentation

##### 6.23.2.1 `nvmlReturn_t` DECLDIR `nvmlDeviceGetFieldValues` (`nvmlDevice_t` device, int valuesCount, `nvmlFieldValue_t` \* values)

Request values for a list of fields for a device. This API allows multiple fields to be queried at once. If any of the underlying fieldIds are populated by the same driver call, the results for those field IDs will be populated from a single call rather than making a driver call for each fieldId.

#### Parameters:

*device* The device handle of the GPU to request field values for

*valuesCount* Number of entries in values that should be retrieved

*values* Array of *valuesCount* structures to hold field values. Each value's fieldId must be populated prior to this call

#### Returns:

- `NVML_SUCCESS` if any values in *values* were populated. Note that you must check the `nvmlReturn` field of each value for each individual status
- `NVML_ERROR_INVALID_ARGUMENT` if *device* is invalid or *values* is NULL

## 6.24 Grid Queries

### Functions

- [nvmlReturn\\_t](#) DECLDIR [nvmlDeviceGetVirtualizationMode](#) (nvmlDevice\_t device, [nvmlGpuVirtualizationMode\\_t](#) \*pVirtualMode)

#### 6.24.1 Detailed Description

This chapter describes NVML operations that are associated with NVIDIA GRID products.

#### 6.24.2 Function Documentation

##### 6.24.2.1 [nvmlReturn\\_t](#) DECLDIR [nvmlDeviceGetVirtualizationMode](#) (nvmlDevice\_t *device*, [nvmlGpuVirtualizationMode\\_t](#) \* *pVirtualMode*)

This method is used to get the virtualization mode corresponding to the GPU.

For Kepler™ or newer fully supported devices.

#### Parameters:

*device* Identifier of the target device

*pVirtualMode* Reference to virtualization mode. One of NVML\_GPU\_VIRTUALIZATION\_?

#### Returns:

- [NVML\\_SUCCESS](#) if *pVirtualMode* is fetched
- [NVML\\_ERROR\\_UNINITIALIZED](#) if the library has not been successfully initialized
- [NVML\\_ERROR\\_INVALID\\_ARGUMENT](#) if *device* is invalid or *pVirtualMode* 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

## 6.25 Grid Commands

### Functions

- [nvmlReturn\\_t](#) DECLDIR [nvmlDeviceSetVirtualizationMode](#) (nvmlDevice\_t device, [nvmlGpuVirtualizationMode\\_t](#) virtualMode)

### 6.25.1 Detailed Description

This chapter describes NVML operations that are associated with NVIDIA GRID products.

### 6.25.2 Function Documentation

#### 6.25.2.1 [nvmlReturn\\_t](#) DECLDIR [nvmlDeviceSetVirtualizationMode](#) (nvmlDevice\_t device, [nvmlGpuVirtualizationMode\\_t](#) virtualMode)

This method is used to set the virtualization mode corresponding to the GPU.

For Kepler™ or newer fully supported devices.

#### Parameters:

*device* Identifier of the target device

*virtualMode* virtualization mode. One of NVML\_GPU\_VIRTUALIZATION\_?

#### Returns:

- [NVML\\_SUCCESS](#) if *pVirtualMode* is set
- [NVML\\_ERROR\\_UNINITIALIZED](#) if the library has not been successfully initialized
- [NVML\\_ERROR\\_INVALID\\_ARGUMENT](#) if *device* is invalid or *pVirtualMode* is NULL
- [NVML\\_ERROR\\_GPU\\_IS\\_LOST](#) if the target GPU has fallen off the bus or is otherwise inaccessible
- [NVML\\_ERROR\\_NOT\\_SUPPORTED](#) if setting of virtualization mode is not supported.
- [NVML\\_ERROR\\_NO\\_PERMISSION](#) if setting of virtualization mode is not allowed for this client.

## 6.26 vGPU Management

### Functions

- [nvmlReturn\\_t DECLDIR nvmlDeviceGetSupportedVgpus](#) (nvmlDevice\_t device, unsigned int \*vgpuCount, nvmlVgpuTypeId\_t \*vgpuTypeIds)
- [nvmlReturn\\_t DECLDIR nvmlDeviceGetCreatableVgpus](#) (nvmlDevice\_t device, unsigned int \*vgpuCount, nvmlVgpuTypeId\_t \*vgpuTypeIds)
- [nvmlReturn\\_t DECLDIR nvmlVgpuTypeGetClass](#) (nvmlVgpuTypeId\_t vgpuTypeId, char \*vgpuTypeClass, unsigned int \*size)
- [nvmlReturn\\_t DECLDIR nvmlVgpuTypeGetName](#) (nvmlVgpuTypeId\_t vgpuTypeId, char \*vgpuTypeName, unsigned int \*size)
- [nvmlReturn\\_t DECLDIR nvmlVgpuTypeGetDeviceID](#) (nvmlVgpuTypeId\_t vgpuTypeId, unsigned long long \*deviceID, unsigned long long \*subsystemID)
- [nvmlReturn\\_t DECLDIR nvmlVgpuTypeGetFramebufferSize](#) (nvmlVgpuTypeId\_t vgpuTypeId, unsigned long long \*fbSize)
- [nvmlReturn\\_t DECLDIR nvmlVgpuTypeGetNumDisplayHeads](#) (nvmlVgpuTypeId\_t vgpuTypeId, unsigned int \*numDisplayHeads)
- [nvmlReturn\\_t DECLDIR nvmlVgpuTypeGetResolution](#) (nvmlVgpuTypeId\_t vgpuTypeId, unsigned int displayIndex, unsigned int \*xdim, unsigned int \*ydim)
- [nvmlReturn\\_t DECLDIR nvmlVgpuTypeGetLicense](#) (nvmlVgpuTypeId\_t vgpuTypeId, char \*vgpuTypeLicenseString, unsigned int size)
- [nvmlReturn\\_t DECLDIR nvmlVgpuTypeGetFrameRateLimit](#) (nvmlVgpuTypeId\_t vgpuTypeId, unsigned int \*frameRateLimit)
- [nvmlReturn\\_t DECLDIR nvmlVgpuTypeGetMaxInstances](#) (nvmlDevice\_t device, nvmlVgpuTypeId\_t vgpuTypeId, unsigned int \*vgpuInstanceCount)
- [nvmlReturn\\_t DECLDIR nvmlDeviceGetActiveVgpus](#) (nvmlDevice\_t device, unsigned int \*vgpuCount, nvmlVgpuInstance\_t \*vgpuInstances)
- [nvmlReturn\\_t DECLDIR nvmlVgpuInstanceGetVmID](#) (nvmlVgpuInstance\_t vgpuInstance, char \*vmId, unsigned int size, nvmlVgpuVmIdType\_t \*vmIdType)
- [nvmlReturn\\_t DECLDIR nvmlVgpuInstanceGetUUID](#) (nvmlVgpuInstance\_t vgpuInstance, char \*uuid, unsigned int size)
- [nvmlReturn\\_t DECLDIR nvmlVgpuInstanceGetVmDriverVersion](#) (nvmlVgpuInstance\_t vgpuInstance, char \*version, unsigned int length)
- [nvmlReturn\\_t DECLDIR nvmlVgpuInstanceGetFbUsage](#) (nvmlVgpuInstance\_t vgpuInstance, unsigned long long \*fbUsage)
- [nvmlReturn\\_t DECLDIR nvmlVgpuInstanceGetLicenseStatus](#) (nvmlVgpuInstance\_t vgpuInstance, unsigned int \*licensed)
- [nvmlReturn\\_t DECLDIR nvmlVgpuInstanceGetType](#) (nvmlVgpuInstance\_t vgpuInstance, nvmlVgpuTypeId\_t \*vgpuTypeId)
- [nvmlReturn\\_t DECLDIR nvmlVgpuInstanceGetFrameRateLimit](#) (nvmlVgpuInstance\_t vgpuInstance, unsigned int \*frameRateLimit)
- [nvmlReturn\\_t DECLDIR nvmlVgpuInstanceGetEncoderCapacity](#) (nvmlVgpuInstance\_t vgpuInstance, unsigned int \*encoderCapacity)
- [nvmlReturn\\_t DECLDIR nvmlVgpuInstanceSetEncoderCapacity](#) (nvmlVgpuInstance\_t vgpuInstance, unsigned int encoderCapacity)
- [nvmlReturn\\_t DECLDIR nvmlDeviceGetVgpuUtilization](#) (nvmlDevice\_t device, unsigned long long lastSeenTimeStamp, nvmlValueType\_t \*sampleValType, unsigned int \*vgpuInstanceSamplesCount, nvmlVgpuInstanceUtilizationSample\_t \*utilizationSamples)
- [nvmlReturn\\_t DECLDIR nvmlDeviceGetVgpuProcessUtilization](#) (nvmlDevice\_t device, unsigned long long lastSeenTimeStamp, unsigned int \*vgpuProcessSamplesCount, nvmlVgpuProcessUtilizationSample\_t \*utilizationSamples)

- `nvmlReturn_t` DECLDIR `nvmlDeviceGetGridLicensableFeatures` (`nvmlDevice_t` device, `nvmlGridLicensableFeatures_t *pGridLicensableFeatures`)
- `nvmlReturn_t` DECLDIR `nvmlVgpuInstanceGetEncoderStats` (`nvmlVgpuInstance_t` vgpuInstance, unsigned int \*sessionCount, unsigned int \*averageFps, unsigned int \*averageLatency)
- `nvmlReturn_t` DECLDIR `nvmlVgpuInstanceGetEncoderSessions` (`nvmlVgpuInstance_t` vgpuInstance, unsigned int \*sessionCount, `nvmlEncoderSessionInfo_t` \*sessionInfo)
- `nvmlReturn_t` DECLDIR `nvmlDeviceGetProcessUtilization` (`nvmlDevice_t` device, `nvmlProcessUtilizationSample_t` \*utilization, unsigned int \*processSamplesCount, unsigned long long lastSeenTimeStamp)

### 6.26.1 Detailed Description

Set of APIs supporting GRID vGPU

### 6.26.2 Function Documentation

#### 6.26.2.1 `nvmlReturn_t` DECLDIR `nvmlDeviceGetActiveVgpus` (`nvmlDevice_t` device, unsigned int \*vgpuCount, `nvmlVgpuInstance_t` \*vgpuInstances)

Retrieve the active vGPU instances on a device.

An array of active vGPU instances is returned in the caller-supplied buffer pointed at by `vgpuInstances`. The array element count is passed in `vgpuCount`, and `vgpuCount` is used to return the number of vGPU instances written to the buffer.

If the supplied buffer is not large enough to accommodate the vGPU instance array, the function returns `NVML_ERROR_INSUFFICIENT_SIZE`, with the element count of `nvmlVgpuInstance_t` array required in `vgpuCount`. To query the number of active vGPU instances, call this function with `*vgpuCount = 0`. The code will return `NVML_ERROR_INSUFFICIENT_SIZE`, or `NVML_SUCCESS` if no vGPU Types are supported.

For Kepler™ or newer fully supported devices.

#### Parameters:

*device* The identifier of the target device

*vgpuCount* Pointer which passes in the array size as well as get back the number of types

*vgpuInstances* Pointer to array in which to return list of vGPU instances

#### Returns:

- `NVML_SUCCESS` successful completion
- `NVML_ERROR_UNINITIALIZED` if the library has not been successfully initialized
- `NVML_ERROR_INVALID_ARGUMENT` if *device* is invalid, or *vgpuCount* is NULL
- `NVML_ERROR_INSUFFICIENT_SIZE` if *size* is too small
- `NVML_ERROR_NOT_SUPPORTED` if vGPU is not supported by the device
- `NVML_ERROR_UNKNOWN` on any unexpected error

#### 6.26.2.2 `nvmlReturn_t` DECLDIR `nvmlDeviceGetCreatableVgpus` (`nvmlDevice_t` device, unsigned int \*vgpuCount, `nvmlVgpuTypeId_t` \*vgpuTypeIds)

Retrieve the currently creatable vGPU types on a physical GPU (device).

An array of creatable vGPU types for the physical GPU indicated by *device* is returned in the caller-supplied buffer pointed at by *vgpuTypeIds*. The element count of `nvmlVgpuTypeId_t` array is passed in *vgpuCount*, and *vgpuCount* is used to return the number of vGPU types written to the buffer.

The creatable vGPU types for a device may differ over time, as there may be restrictions on what type of vGPU types can concurrently run on a device. For example, if only one vGPU type is allowed at a time on a device, then the creatable list will be restricted to whatever vGPU type is already running on the device.

If the supplied buffer is not large enough to accommodate the vGPU type array, the function returns `NVML_ERROR_INSUFFICIENT_SIZE`, with the element count of `nvmlVgpuTypeId_t` array required in *vgpuCount*. To query the number of vGPU types creatable for the GPU, call this function with `*vgpuCount = 0`. The code will return `NVML_ERROR_INSUFFICIENT_SIZE`, or `NVML_SUCCESS` if no vGPU types are creatable.

**Parameters:**

- device* The identifier of the target device
- vgpuCount* Pointer to caller-supplied array size, and returns number of vGPU types
- vgpuTypeIds* Pointer to caller-supplied array in which to return list of vGPU types

**Returns:**

- `NVML_SUCCESS` successful completion
- `NVML_ERROR_INSUFFICIENT_SIZE` *vgpuTypeIds* buffer is too small, array element count is returned in *vgpuCount*
- `NVML_ERROR_INVALID_ARGUMENT` if *vgpuCount* is NULL
- `NVML_ERROR_NOT_SUPPORTED` if vGPU is not supported by the device
- `NVML_ERROR_VGPU_ECC_NOT_SUPPORTED` if ECC is enabled on the device
- `NVML_ERROR_UNKNOWN` on any unexpected error

**6.26.2.3 `nvmlReturn_t DECLDIR nvmlDeviceGetGridLicensableFeatures (nvmlDevice_t device, nvmlGridLicensableFeatures_t * pGridLicensableFeatures)`**

Retrieve the GRID licensable features.

Identifies whether the system supports GRID Software Licensing. If it does, return the list of licensable feature(s) and their current license status.

**Parameters:**

- device* Identifier of the target device
- pGridLicensableFeatures* Pointer to structure in which GRID licensable features are returned

**Returns:**

- `NVML_SUCCESS` if licensable features are successfully retrieved
- `NVML_ERROR_INVALID_ARGUMENT` if *pGridLicensableFeatures* is NULL
- `NVML_ERROR_UNKNOWN` on any unexpected error

#### 6.26.2.4 `nvmlReturn_t DECLDIR nvmlDeviceGetProcessUtilization (nvmlDevice_t device, nvmlProcessUtilizationSample_t * utilization, unsigned int * processSamplesCount, unsigned long lastSeenTimeStamp)`

Retrieves the current utilization and process ID

For Maxwell™ or newer fully supported devices.

Reads recent utilization of GPU SM (3D/Compute), framebuffer, video encoder, and video decoder for processes running. Utilization values are returned as an array of utilization sample structures in the caller-supplied buffer pointed at by *utilization*. One utilization sample structure is returned per process running, that had some non-zero utilization during the last sample period. It includes the CPU timestamp at which the samples were recorded. Individual utilization values are returned as "unsigned int" values.

To read utilization values, first determine the size of buffer required to hold the samples by invoking the function with *utilization* set to NULL. The caller should allocate a buffer of size `processSamplesCount * sizeof(nvmlProcessUtilizationSample_t)`. Invoke the function again with the allocated buffer passed in *utilization*, and *processSamplesCount* set to the number of entries the buffer is sized for.

On successful return, the function updates *processSamplesCount* with the number of process utilization sample structures that were actually written. This may differ from a previously read value as instances are created or destroyed.

*lastSeenTimeStamp* represents the CPU timestamp in microseconds at which utilization samples were last read. Set it to 0 to read utilization based on all the samples maintained by the driver's internal sample buffer. Set *lastSeenTimeStamp* to a *timestamp* retrieved from a previous query to read utilization since the previous query.

#### Parameters:

*device* The identifier of the target device

*utilization* Pointer to caller-supplied buffer in which guest process utilization samples are returned

*processSamplesCount* Pointer to caller-supplied array size, and returns number of processes running

*lastSeenTimeStamp* Return only samples with timestamp greater than *lastSeenTimeStamp*.

#### 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

#### 6.26.2.5 `nvmlReturn_t DECLDIR nvmlDeviceGetSupportedVgpus (nvmlDevice_t device, unsigned int * vgpuCount, nvmlVgpuTypeId_t * vgpuTypeIds)`

Retrieve the supported vGPU types on a physical GPU (device).

An array of supported vGPU types for the physical GPU indicated by *device* is returned in the caller-supplied buffer pointed at by *vgpuTypeIds*. The element count of `nvmlVgpuTypeId_t` array is passed in *vgpuCount*, and *vgpuCount* is used to return the number of vGPU types written to the buffer.

If the supplied buffer is not large enough to accommodate the vGPU type array, the function returns `NVML_ERROR_INSUFFICIENT_SIZE`, with the element count of `nvmlVgpuTypeId_t` array required in *vgpuCount*. To query the number of vGPU types supported for the GPU, call this function with *vgpuCount* = 0. The code will return `NVML_ERROR_INSUFFICIENT_SIZE`, or `NVML_SUCCESS` if no vGPU types are supported.

**Parameters:**

- device* The identifier of the target device
- vgpuCount* Pointer to caller-supplied array size, and returns number of vGPU types
- vgpuTypeIds* Pointer to caller-supplied array in which to return list of vGPU types

**Returns:**

- [NVML\\_SUCCESS](#) successful completion
- [NVML\\_ERROR\\_INSUFFICIENT\\_SIZE](#) *vgpuTypeIds* buffer is too small, array element count is returned in *vgpuCount*
- [NVML\\_ERROR\\_INVALID\\_ARGUMENT](#) if *vgpuCount* is NULL or *device* is invalid
- [NVML\\_ERROR\\_NOT\\_SUPPORTED](#) if vGPU is not supported by the device
- [NVML\\_ERROR\\_VGPU\\_ECC\\_NOT\\_SUPPORTED](#) if ECC is enabled on the device
- [NVML\\_ERROR\\_UNKNOWN](#) on any unexpected error

#### 6.26.2.6 `nvmlReturn_t DECLDIR nvmlDeviceGetVgpuProcessUtilization (nvmlDevice_t device, unsigned long long lastSeenTimeStamp, unsigned int * vgpuProcessSamplesCount, nvmlVgpuProcessUtilizationSample_t * utilizationSamples)`

Retrieves current utilization for processes running on vGPUs on a physical GPU (device).

For Maxwell™ or newer fully supported devices.

Reads recent utilization of GPU SM (3D/Compute), framebuffer, video encoder, and video decoder for processes running on vGPU instances active on a device. Utilization values are returned as an array of utilization sample structures in the caller-supplied buffer pointed at by *utilizationSamples*. One utilization sample structure is returned per process running on vGPU instances, that had some non-zero utilization during the last sample period. It includes the CPU timestamp at which the samples were recorded. Individual utilization values are returned as "unsigned int" values.

To read utilization values, first determine the size of buffer required to hold the samples by invoking the function with *utilizationSamples* set to NULL. The function will return [NVML\\_ERROR\\_INSUFFICIENT\\_SIZE](#), with the current vGPU instance count in *vgpuProcessSamplesCount*. The caller should allocate a buffer of size *vgpuProcessSamplesCount* \* `sizeof(nvmlVgpuProcessUtilizationSample_t)`. Invoke the function again with the allocated buffer passed in *utilizationSamples*, and *vgpuProcessSamplesCount* set to the number of entries the buffer is sized for.

On successful return, the function updates *vgpuSubProcessSampleCount* with the number of vGPU sub process utilization sample structures that were actually written. This may differ from a previously read value depending on the number of processes that are active in any given sample period.

*lastSeenTimeStamp* represents the CPU timestamp in microseconds at which utilization samples were last read. Set it to 0 to read utilization based on all the samples maintained by the driver's internal sample buffer. Set *lastSeenTimeStamp* to a *timeStamp* retrieved from a previous query to read utilization since the previous query.

**Parameters:**

- device* The identifier for the target device
- lastSeenTimeStamp* Return only samples with timestamp greater than *lastSeenTimeStamp*.
- vgpuProcessSamplesCount* Pointer to caller-supplied array size, and returns number of processes running on vGPU instances
- utilizationSamples* Pointer to caller-supplied buffer in which vGPU sub process utilization samples are returned

**Returns:**

- [NVML\\_SUCCESS](#) if utilization samples are successfully retrieved
- [NVML\\_ERROR\\_UNINITIALIZED](#) if the library has not been successfully initialized
- [NVML\\_ERROR\\_INVALID\\_ARGUMENT](#) if *device* is invalid, *vgpuProcessSamplesCount* or a sample count of 0 is passed with a non-NULL *utilizationSamples*
- [NVML\\_ERROR\\_INSUFFICIENT\\_SIZE](#) if supplied *vgpuProcessSamplesCount* is too small to return samples for all vGPU instances currently executing on the device
- [NVML\\_ERROR\\_NOT\\_SUPPORTED](#) if vGPU 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

**6.26.2.7 nvmlReturn\_t DECLDIR nvmlDeviceGetVgpuUtilization (nvmlDevice\_t device, unsigned long long lastSeenTimeStamp, nvmlValueType\_t \* sampleValType, unsigned int \* vgpuInstanceSamplesCount, nvmlVgpuInstanceUtilizationSample\_t \* utilizationSamples)**

Retrieves current utilization for vGPUs on a physical GPU (device).

For Kepler™ or newer fully supported devices.

Reads recent utilization of GPU SM (3D/Compute), framebuffer, video encoder, and video decoder for vGPU instances running on a device. Utilization values are returned as an array of utilization sample structures in the caller-supplied buffer pointed at by *utilizationSamples*. One utilization sample structure is returned per vGPU instance, and includes the CPU timestamp at which the samples were recorded. Individual utilization values are returned as "unsigned int" values in [nvmlValue\\_t](#) unions. The function sets the caller-supplied *sampleValType* to [NVML\\_VALUE\\_TYPE\\_UNSIGNED\\_INT](#) to indicate the returned value type.

To read utilization values, first determine the size of buffer required to hold the samples by invoking the function with *utilizationSamples* set to NULL. The function will return [NVML\\_ERROR\\_INSUFFICIENT\\_SIZE](#), with the current vGPU instance count in *vgpuInstanceSamplesCount*, or [NVML\\_SUCCESS](#) if the current vGPU instance count is zero. The caller should allocate a buffer of size *vgpuInstanceSamplesCount* \* `sizeof(nvmlVgpuInstanceUtilizationSample_t)`. Invoke the function again with the allocated buffer passed in *utilizationSamples*, and *vgpuInstanceSamplesCount* set to the number of entries the buffer is sized for.

On successful return, the function updates *vgpuInstanceSampleCount* with the number of vGPU utilization sample structures that were actually written. This may differ from a previously read value as vGPU instances are created or destroyed.

*lastSeenTimeStamp* represents the CPU timestamp in microseconds at which utilization samples were last read. Set it to 0 to read utilization based on all the samples maintained by the driver's internal sample buffer. Set *lastSeenTimeStamp* to a *timeStamp* retrieved from a previous query to read utilization since the previous query.

**Parameters:**

*device* The identifier for the target device

*lastSeenTimeStamp* Return only samples with timestamp greater than *lastSeenTimeStamp*.

*sampleValType* Pointer to caller-supplied buffer to hold the type of returned sample values

*vgpuInstanceSamplesCount* Pointer to caller-supplied array size, and returns number of vGPU instances

*utilizationSamples* Pointer to caller-supplied buffer in which vGPU utilization samples are returned

**Returns:**

- [NVML\\_SUCCESS](#) if utilization samples are successfully retrieved

- [NVML\\_ERROR\\_UNINITIALIZED](#) if the library has not been successfully initialized
- [NVML\\_ERROR\\_INVALID\\_ARGUMENT](#) if *device* is invalid, *vgpuInstanceSamplesCount* or *sampleValueType* is NULL, or a sample count of 0 is passed with a non-NULL *utilizationSamples*
- [NVML\\_ERROR\\_INSUFFICIENT\\_SIZE](#) if supplied *vgpuInstanceSamplesCount* is too small to return samples for all vGPU instances currently executing on the device
- [NVML\\_ERROR\\_NOT\\_SUPPORTED](#) if vGPU 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

#### 6.26.2.8 `nvmlReturn_t DECLDIR nvmlVgpuInstanceGetEncoderCapacity (nvmlVgpuInstance_t vgpuInstance, unsigned int * encoderCapacity)`

Retrieve the encoder Capacity of a vGPU instance, in macroblocks per second.

For Maxwell™ or newer fully supported devices.

##### Parameters:

- vgpuInstance* Identifier of the target vGPU instance
- encoderCapacity* Reference to an unsigned int for the encoder capacity

##### Returns:

- [NVML\\_SUCCESS](#) if *encoderCapacity* has been retrieved
- [NVML\\_ERROR\\_UNINITIALIZED](#) if the library has not been successfully initialized
- [NVML\\_ERROR\\_INVALID\\_ARGUMENT](#) if *vgpuInstance* is invalid, or *encoderQueryType* is invalid
- [NVML\\_ERROR\\_UNKNOWN](#) on any unexpected error

#### 6.26.2.9 `nvmlReturn_t DECLDIR nvmlVgpuInstanceGetEncoderSessions (nvmlVgpuInstance_t vgpuInstance, unsigned int * sessionCount, nvmlEncoderSessionInfo_t * sessionInfo)`

Retrieves information about all active encoder sessions on a vGPU Instance.

An array of active encoder sessions is returned in the caller-supplied buffer pointed at by *sessionInfo*. The array element count is passed in *sessionCount*, and *sessionCount* is used to return the number of sessions written to the buffer.

If the supplied buffer is not large enough to accommodate the active session array, the function returns [NVML\\_ERROR\\_INSUFFICIENT\\_SIZE](#), with the element count of `nvmlEncoderSessionInfo_t` array required in *sessionCount*. To query the number of active encoder sessions, call this function with *\*sessionCount* = 0. The code will return [NVML\\_SUCCESS](#) with number of active encoder sessions updated in *\*sessionCount*.

For Maxwell™ or newer fully supported devices.

##### Parameters:

- vgpuInstance* Identifier of the target vGPU instance
- sessionCount* Reference to caller supplied array size, and returns the number of sessions.
- sessionInfo* Reference to caller supplied array in which the list of session information is returned.

**Returns:**

- [NVML\\_SUCCESS](#) if *sessionInfo* is fetched
- [NVML\\_ERROR\\_UNINITIALIZED](#) if the library has not been successfully initialized
- [NVML\\_ERROR\\_INSUFFICIENT\\_SIZE](#) if *sessionCount* is too small, array element count is returned in *sessionCount*
- [NVML\\_ERROR\\_INVALID\\_ARGUMENT](#) if *sessionCount* is NULL or *vgpuInstance* is invalid..
- [NVML\\_ERROR\\_UNKNOWN](#) on any unexpected error

### 6.26.2.10 `nvmlReturn_t DECLDIR nvmlVgpuInstanceGetEncoderStats (nvmlVgpuInstance_t vgpuInstance, unsigned int * sessionCount, unsigned int * averageFps, unsigned int * averageLatency)`

Retrieves the current encoder statistics of a vGPU Instance

For Maxwell™ or newer fully supported devices.

**Parameters:**

*vgpuInstance* Identifier of the target vGPU instance

*sessionCount* Reference to an unsigned int for count of active encoder sessions

*averageFps* Reference to an unsigned int for trailing average FPS of all active sessions

*averageLatency* Reference to an unsigned int for encode latency in microseconds

**Returns:**

- [NVML\\_SUCCESS](#) if *sessionCount*, *averageFps* and *averageLatency* is fetched
- [NVML\\_ERROR\\_UNINITIALIZED](#) if the library has not been successfully initialized
- [NVML\\_ERROR\\_INVALID\\_ARGUMENT](#) if *sessionCount*, or *averageFps* or *averageLatency* is NULL or *vgpuInstance* is invalid.
- [NVML\\_ERROR\\_UNKNOWN](#) on any unexpected error

### 6.26.2.11 `nvmlReturn_t DECLDIR nvmlVgpuInstanceGetFbUsage (nvmlVgpuInstance_t vgpuInstance, unsigned long long * fbUsage)`

Retrieve the framebuffer usage in bytes.

Framebuffer usage is the amount of vGPU framebuffer memory that is currently in use by the VM.

For Kepler™ or newer fully supported devices.

**Parameters:**

*vgpuInstance* The identifier of the target instance

*fbUsage* Pointer to framebuffer usage in bytes

**Returns:**

- [NVML\\_SUCCESS](#) successful completion
- [NVML\\_ERROR\\_UNINITIALIZED](#) if the library has not been successfully initialized
- [NVML\\_ERROR\\_INVALID\\_ARGUMENT](#) if *vgpuInstance* is invalid, or *fbUsage* is NULL
- [NVML\\_ERROR\\_UNKNOWN](#) on any unexpected error

### 6.26.2.12 `nvmlReturn_t DECLDIR nvmlVgpuInstanceGetFrameRateLimit (nvmlVgpuInstance_t vgpuInstance, unsigned int * frameRateLimit)`

Retrieve the frame rate limit set for the vGPU instance.

Returns the value of the frame rate limit set for the vGPU instance

For Kepler™ or newer fully supported devices.

#### Parameters:

*vgpuInstance* Identifier of the target vGPU instance

*frameRateLimit* Reference to return the frame rate limit

#### Returns:

- [NVML\\_SUCCESS](#) if *frameRateLimit* has been set
- [NVML\\_ERROR\\_NOT\\_SUPPORTED](#) if frame rate limiter is turned off for the vGPU type
- [NVML\\_ERROR\\_UNINITIALIZED](#) if the library has not been successfully initialized
- [NVML\\_ERROR\\_INVALID\\_ARGUMENT](#) if *vgpuInstance* is invalid, or *frameRateLimit* is NULL
- [NVML\\_ERROR\\_UNKNOWN](#) on any unexpected error

### 6.26.2.13 `nvmlReturn_t DECLDIR nvmlVgpuInstanceGetLicenseStatus (nvmlVgpuInstance_t vgpuInstance, unsigned int * licensed)`

Retrieve the current licensing state of the vGPU instance.

If the vGPU is currently licensed, *licensed* is set to 1, otherwise it is set to 0.

For Kepler™ or newer fully supported devices.

#### Parameters:

*vgpuInstance* Identifier of the target vGPU instance

*licensed* Reference to return the licensing status

#### Returns:

- [NVML\\_SUCCESS](#) if *licensed* has been set
- [NVML\\_ERROR\\_UNINITIALIZED](#) if the library has not been successfully initialized
- [NVML\\_ERROR\\_INVALID\\_ARGUMENT](#) if *vgpuInstance* is invalid, or *licensed* is NULL
- [NVML\\_ERROR\\_UNKNOWN](#) on any unexpected error

### 6.26.2.14 `nvmlReturn_t DECLDIR nvmlVgpuInstanceGetType (nvmlVgpuInstance_t vgpuInstance, nvmlVgpuTypeId_t * vgpuTypeId)`

Retrieve the vGPU type of a vGPU instance.

Returns the vGPU type ID of vgpu assigned to the vGPU instance.

For Kepler™ or newer fully supported devices.

#### Parameters:

*vgpuInstance* Identifier of the target vGPU instance

*vgpuTypeId* Reference to return the *vgpuTypeId*

**Returns:**

- [NVML\\_SUCCESS](#) if *vgpuTypeId* has been set
- [NVML\\_ERROR\\_UNINITIALIZED](#) if the library has not been successfully initialized
- [NVML\\_ERROR\\_INVALID\\_ARGUMENT](#) if *vgpuInstance* is invalid, or *vgpuTypeId* is NULL
- [NVML\\_ERROR\\_UNKNOWN](#) on any unexpected error

**6.26.2.15** `nvmlReturn_t DECLDIR nvmlVgpuInstanceGetUUID (nvmlVgpuInstance_t vgpuInstance, char * uuid, unsigned int size)`

Retrieve the UUID of a vGPU instance.

The UUID is a globally unique identifier associated with the vGPU, and is returned as a 5-part hexadecimal string, not exceeding 80 characters in length (including the NULL terminator). See [nvmlConstants::NVML\\_DEVICE\\_UUID\\_BUFFER\\_SIZE](#).

For Kepler™ or newer fully supported devices.

**Parameters:**

*vgpuInstance* Identifier of the target vGPU instance

*uuid* Pointer to caller-supplied buffer to hold vGPU UUID

*size* Size of buffer in bytes

**Returns:**

- [NVML\\_SUCCESS](#) successful completion
- [NVML\\_ERROR\\_UNINITIALIZED](#) if the library has not been successfully initialized
- [NVML\\_ERROR\\_INVALID\\_ARGUMENT](#) if *vgpuInstance* is invalid, or *uuid* is NULL
- [NVML\\_ERROR\\_INSUFFICIENT\\_SIZE](#) if *size* is too small
- [NVML\\_ERROR\\_UNKNOWN](#) on any unexpected error

**6.26.2.16** `nvmlReturn_t DECLDIR nvmlVgpuInstanceGetVmDriverVersion (nvmlVgpuInstance_t vgpuInstance, char * version, unsigned int length)`

Retrieve the NVIDIA driver version installed in the VM associated with a vGPU.

The version is returned as an alphanumeric string in the caller-supplied buffer *version*. The length of the version string will not exceed 80 characters in length (including the NUL terminator). See [nvmlConstants::NVML\\_SYSTEM\\_DRIVER\\_VERSION\\_BUFFER\\_SIZE](#).

[nvmlVgpuInstanceGetVmDriverVersion\(\)](#) may be called at any time for a vGPU instance. The guest VM driver version is returned as "Unknown" if no NVIDIA driver is installed in the VM, or the VM has not yet booted to the point where the NVIDIA driver is loaded and initialized.

For Kepler™ or newer fully supported devices.

**Parameters:**

*vgpuInstance* Identifier of the target vGPU instance

*version* Caller-supplied buffer to return driver version string

*length* Size of *version* buffer

**Returns:**

- [NVML\\_SUCCESS](#) if *version* has been set
- [NVML\\_ERROR\\_UNINITIALIZED](#) if the library has not been successfully initialized
- [NVML\\_ERROR\\_INVALID\\_ARGUMENT](#) if *vgpuInstance* is invalid
- [NVML\\_ERROR\\_INSUFFICIENT\\_SIZE](#) if *length* is too small
- [NVML\\_ERROR\\_UNKNOWN](#) on any unexpected error

**6.26.2.17** `nvmlReturn_t DECLDIR nvmlVgpuInstanceGetVmID (nvmlVgpuInstance_t vgpuInstance, char * vmId, unsigned int size, nvmlVgpuVmIdType_t * vmIdType)`

Retrieve the VM ID associated with a vGPU instance.

The VM ID is returned as a string, not exceeding 80 characters in length (including the NUL terminator). See [nvmlConstants::NVML\\_DEVICE\\_UUID\\_BUFFER\\_SIZE](#).

The format of the VM ID varies by platform, and is indicated by the type identifier returned in *vmIdType*.

For Kepler™ or newer fully supported devices.

**Parameters:**

*vgpuInstance* Identifier of the target vGPU instance

*vmId* Pointer to caller-supplied buffer to hold VM ID

*size* Size of buffer in bytes

*vmIdType* Pointer to hold VM ID type

**Returns:**

- [NVML\\_SUCCESS](#) successful completion
- [NVML\\_ERROR\\_UNINITIALIZED](#) if the library has not been successfully initialized
- [NVML\\_ERROR\\_INVALID\\_ARGUMENT](#) if *vgpuInstance* is invalid, or *vmId* or *vmIdType* are NULL
- [NVML\\_ERROR\\_INSUFFICIENT\\_SIZE](#) if *size* is too small
- [NVML\\_ERROR\\_UNKNOWN](#) on any unexpected error

**6.26.2.18** `nvmlReturn_t DECLDIR nvmlVgpuInstanceSetEncoderCapacity (nvmlVgpuInstance_t vgpuInstance, unsigned int encoderCapacity)`

Set the encoder Capacity of a vGPU instance, in macroblocks per second.

For Maxwell™ or newer fully supported devices.

**Parameters:**

*vgpuInstance* Identifier of the target vGPU instance

*encoderCapacity* Unsigned int for the encoder capacity value

**Returns:**

- [NVML\\_SUCCESS](#) if *encoderCapacity* has been set
- [NVML\\_ERROR\\_UNINITIALIZED](#) if the library has not been successfully initialized
- [NVML\\_ERROR\\_INVALID\\_ARGUMENT](#) if *vgpuInstance* is invalid
- [NVML\\_ERROR\\_UNKNOWN](#) on any unexpected error

**6.26.2.19** `nvmlReturn_t DECLDIR nvmlVgpuTypeGetClass (nvmlVgpuTypeId_t vgpuTypeId, char * vgpuTypeClass, unsigned int * size)`

Retrieve the class of a vGPU type. It will not exceed 64 characters in length (including the NUL terminator). See [nvmlConstants::NVML\\_DEVICE\\_NAME\\_BUFFER\\_SIZE](#).

For Kepler™ or newer fully supported devices.

**Parameters:**

*vgpuTypeId* Handle to vGPU type

*vgpuTypeClass* Pointer to string array to return class in

*size* Size of string

**Returns:**

- [NVML\\_SUCCESS](#) successful completion
- [NVML\\_ERROR\\_INVALID\\_ARGUMENT](#) if *vgpuTypeId* is invalid, or *vgpuTypeClass* is NULL
- [NVML\\_ERROR\\_INSUFFICIENT\\_SIZE](#) if *size* is too small
- [NVML\\_ERROR\\_UNKNOWN](#) on any unexpected error

**6.26.2.20** `nvmlReturn_t DECLDIR nvmlVgpuTypeGetDeviceID (nvmlVgpuTypeId_t vgpuTypeId, unsigned long long * deviceID, unsigned long long * subsystemID)`

Retrieve the device ID of a vGPU type.

For Kepler™ or newer fully supported devices.

**Parameters:**

*vgpuTypeId* Handle to vGPU type

*deviceID* Device ID and vendor ID of the device contained in single 32 bit value

*subsystemID* Subsystem ID and subsystem vendor ID of the device contained in single 32 bit value

**Returns:**

- [NVML\\_SUCCESS](#) successful completion
- [NVML\\_ERROR\\_UNINITIALIZED](#) if the library has not been successfully initialized
- [NVML\\_ERROR\\_INVALID\\_ARGUMENT](#) if *vgpuTypeId* is invalid, or *deviceID* or *subsystemID* are NULL
- [NVML\\_ERROR\\_UNKNOWN](#) on any unexpected error

### 6.26.2.21 `nvmlReturn_t DECLDIR nvmlVgpuTypeGetFramebufferSize (nvmlVgpuTypeId_t vgpuTypeId, unsigned long long * fbSize)`

Retrieve the vGPU framebuffer size in bytes.

For Kepler™ or newer fully supported devices.

#### Parameters:

*vgpuTypeId* Handle to vGPU type

*fbSize* Pointer to framebuffer size in bytes

#### Returns:

- [NVML\\_SUCCESS](#) successful completion
- [NVML\\_ERROR\\_UNINITIALIZED](#) if the library has not been successfully initialized
- [NVML\\_ERROR\\_INVALID\\_ARGUMENT](#) if *vgpuTypeId* is invalid, or *fbSize* is NULL
- [NVML\\_ERROR\\_UNKNOWN](#) on any unexpected error

### 6.26.2.22 `nvmlReturn_t DECLDIR nvmlVgpuTypeGetFrameRateLimit (nvmlVgpuTypeId_t vgpuTypeId, unsigned int * frameRateLimit)`

Retrieve the static frame rate limit value of the vGPU type

For Kepler™ or newer fully supported devices.

#### Parameters:

*vgpuTypeId* Handle to vGPU type

*frameRateLimit* Reference to return the frame rate limit value

#### Returns:

- [NVML\\_SUCCESS](#) successful completion
- [NVML\\_ERROR\\_NOT\\_SUPPORTED](#) if frame rate limiter is turned off for the vGPU type
- [NVML\\_ERROR\\_UNINITIALIZED](#) if the library has not been successfully initialized
- [NVML\\_ERROR\\_INVALID\\_ARGUMENT](#) if *device* is invalid, or *frameRateLimit* is NULL
- [NVML\\_ERROR\\_UNKNOWN](#) on any unexpected error

### 6.26.2.23 `nvmlReturn_t DECLDIR nvmlVgpuTypeGetLicense (nvmlVgpuTypeId_t vgpuTypeId, char * vgpuTypeLicenseString, unsigned int size)`

Retrieve license requirements for a vGPU type

The license type and version required to run the specified vGPU type is returned as an alphanumeric string, in the form "<license name>,<version>", for example "GRID-Virtual-PC,2.0". If a vGPU is runnable with\* more than one type of license, the licenses are delimited by a semicolon, for example "GRID-Virtual-PC,2.0;GRID-Virtual-WS,2.0;GRID-Virtual-WS-Ext,2.0".

The total length of the returned string will not exceed 128 characters, including the NUL terminator. See [nvmlVgpuConstants::NVML\\_GRID\\_LICENSE\\_BUFFER\\_SIZE](#).

For Kepler™ or newer fully supported devices.

**Parameters:**

*vgpuTypeId* Handle to vGPU type  
*vgpuTypeLicenseString* Pointer to buffer to return license info  
*size* Size of *vgpuTypeLicenseString* buffer

**Returns:**

- [NVML\\_SUCCESS](#) successful completion
- [NVML\\_ERROR\\_UNINITIALIZED](#) if the library has not been successfully initialized
- [NVML\\_ERROR\\_INVALID\\_ARGUMENT](#) if *vgpuTypeId* is invalid, or *vgpuTypeLicenseString* is NULL
- [NVML\\_ERROR\\_INSUFFICIENT\\_SIZE](#) if *size* is too small
- [NVML\\_ERROR\\_UNKNOWN](#) on any unexpected error

#### 6.26.2.24 `nvmlReturn_t DECLDIR nvmlVgpuTypeGetMaxInstances (nvmlDevice_t device, nvmlVgpuTypeId_t vgpuTypeId, unsigned int * vgpuInstanceCount)`

Retrieve the maximum number of vGPU instances creatable on a device for given vGPU type  
 For Kepler <sup>TM</sup> or newer fully supported devices.

**Parameters:**

*device* The identifier of the target device  
*vgpuTypeId* Handle to vGPU type  
*vgpuInstanceCount* Pointer to get the max number of vGPU instances that can be created on a device for given *vgpuTypeId*

**Returns:**

- [NVML\\_SUCCESS](#) successful completion
- [NVML\\_ERROR\\_UNINITIALIZED](#) if the library has not been successfully initialized
- [NVML\\_ERROR\\_INVALID\\_ARGUMENT](#) if *vgpuTypeId* is invalid or is not supported on target device, or *vgpuInstanceCount* is NULL
- [NVML\\_ERROR\\_UNKNOWN](#) on any unexpected error

#### 6.26.2.25 `nvmlReturn_t DECLDIR nvmlVgpuTypeGetName (nvmlVgpuTypeId_t vgpuTypeId, char * vgpuTypeName, unsigned int * size)`

Retrieve the vGPU type name.

The name is an alphanumeric string that denotes a particular vGPU, e.g. GRID M60-2Q. It will not exceed 64 characters in length (including the NUL terminator). See [nvmlConstants::NVML\\_DEVICE\\_NAME\\_BUFFER\\_SIZE](#).

For Kepler <sup>TM</sup> or newer fully supported devices.

**Parameters:**

*vgpuTypeId* Handle to vGPU type  
*vgpuTypeName* Pointer to buffer to return name  
*size* Size of buffer

**Returns:**

- [NVML\\_SUCCESS](#) successful completion
- [NVML\\_ERROR\\_INVALID\\_ARGUMENT](#) if *vgpuTypeId* is invalid, or *name* is NULL
- [NVML\\_ERROR\\_INSUFFICIENT\\_SIZE](#) if *size* is too small
- [NVML\\_ERROR\\_UNKNOWN](#) on any unexpected error

### 6.26.2.26 `nvmlReturn_t DECLDIR nvmlVgpuTypeGetNumDisplayHeads (nvmlVgpuTypeId_t vgpuTypeId, unsigned int * numDisplayHeads)`

Retrieve count of vGPU's supported display heads.

For Kepler™ or newer fully supported devices.

**Parameters:**

*vgpuTypeId* Handle to vGPU type

*numDisplayHeads* Pointer to number of display heads

**Returns:**

- [NVML\\_SUCCESS](#) successful completion
- [NVML\\_ERROR\\_UNINITIALIZED](#) if the library has not been successfully initialized
- [NVML\\_ERROR\\_INVALID\\_ARGUMENT](#) if *vgpuTypeId* is invalid, or *numDisplayHeads* is NULL
- [NVML\\_ERROR\\_UNKNOWN](#) on any unexpected error

### 6.26.2.27 `nvmlReturn_t DECLDIR nvmlVgpuTypeGetResolution (nvmlVgpuTypeId_t vgpuTypeId, unsigned int displayIndex, unsigned int * xdim, unsigned int * ydim)`

Retrieve vGPU display head's maximum supported resolution.

For Kepler™ or newer fully supported devices.

**Parameters:**

*vgpuTypeId* Handle to vGPU type

*displayIndex* Zero-based index of display head

*xdim* Pointer to maximum number of pixels in X dimension

*ydim* Pointer to maximum number of pixels in Y dimension

**Returns:**

- [NVML\\_SUCCESS](#) successful completion
- [NVML\\_ERROR\\_UNINITIALIZED](#) if the library has not been successfully initialized
- [NVML\\_ERROR\\_INVALID\\_ARGUMENT](#) if *vgpuTypeId* is invalid, or *xdim* or *ydim* are NULL, or *displayIndex* is out of range.
- [NVML\\_ERROR\\_UNKNOWN](#) on any unexpected error

## 6.27 NvmlClocksThrottleReasons

### Defines

- #define `nvmlClocksThrottleReasonGpuIdle` 0x0000000000000001LL
- #define `nvmlClocksThrottleReasonApplicationsClocksSetting` 0x0000000000000002LL
- #define `nvmlClocksThrottleReasonUserDefinedClocks` `nvmlClocksThrottleReasonApplicationsClocksSetting`
- #define `nvmlClocksThrottleReasonSwPowerCap` 0x0000000000000004LL
- #define `nvmlClocksThrottleReasonHwSlowdown` 0x0000000000000008LL
- #define `nvmlClocksThrottleReasonSyncBoost` 0x0000000000000010LL
- #define `nvmlClocksThrottleReasonSwThermalSlowdown` 0x0000000000000020LL
- #define `nvmlClocksThrottleReasonHwThermalSlowdown` 0x0000000000000040LL
- #define `nvmlClocksThrottleReasonHwPowerBrakeSlowdown` 0x0000000000000080LL
- #define `nvmlClocksThrottleReasonNone` 0x0000000000000000LL
- #define `nvmlClocksThrottleReasonAll`

### 6.27.1 Define Documentation

#### 6.27.1.1 #define `nvmlClocksThrottleReasonAll`

##### Value:

```
(nvmlClocksThrottleReasonNone \
 | nvmlClocksThrottleReasonGpuIdle \
 | nvmlClocksThrottleReasonApplicationsClocksSetting \
 | nvmlClocksThrottleReasonSwPowerCap \
 | nvmlClocksThrottleReasonHwSlowdown \
 | nvmlClocksThrottleReasonSyncBoost \
 | nvmlClocksThrottleReasonSwThermalSlowdown \
 | nvmlClocksThrottleReasonHwThermalSlowdown \
 | nvmlClocksThrottleReasonHwPowerBrakeSlowdown \
)
```

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

#### 6.27.1.2 #define `nvmlClocksThrottleReasonApplicationsClocksSetting` 0x0000000000000002LL

GPU clocks are limited by current setting of applications clocks

##### See also:

[nvmlDeviceSetApplicationsClocks](#)  
[nvmlDeviceGetApplicationsClock](#)

#### 6.27.1.3 #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

**6.27.1.4 #define nvmlClocksThrottleReasonHwPowerBrakeSlowdown 0x0000000000000080LL**

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

This is an indicator of:

- External Power Brake Assertion being triggered (e.g. by the system power supply)

**See also:**

[nvmlDeviceGetTemperature](#)  
[nvmlDeviceGetTemperatureThreshold](#)  
[nvmlDeviceGetPowerUsage](#)

**6.27.1.5 #define nvmlClocksThrottleReasonHwSlowdown 0x000000000000008LL**

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](#)

**6.27.1.6 #define nvmlClocksThrottleReasonHwThermalSlowdown 0x000000000000040LL**

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

This is an indicator of:

- temperature being too high

**See also:**

[nvmlDeviceGetTemperature](#)  
[nvmlDeviceGetTemperatureThreshold](#)  
[nvmlDeviceGetPowerUsage](#)

**6.27.1.7 #define nvmlClocksThrottleReasonNone 0x000000000000000LL**

Bit mask representing no clocks throttling

Clocks are as high as possible.

**6.27.1.8 #define nvmlClocksThrottleReasonSwPowerCap 0x0000000000000004LL**

SW Power Scaling algorithm is reducing the clocks below requested clocks

See also:

[nvmlDeviceGetPowerUsage](#)  
[nvmlDeviceSetPowerManagementLimit](#)  
[nvmlDeviceGetPowerManagementLimit](#)

**6.27.1.9 #define nvmlClocksThrottleReasonSwThermalSlowdown 0x0000000000000020LL**

SW Thermal Slowdown

This is an indicator of one or more of the following:

- Current GPU temperature above the GPU Max Operating Temperature
- Current memory temperature above the Memory Max Operating Temperature

**6.27.1.10 #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.

**6.27.1.11 #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 BARI Memory (in bytes).*
- unsigned long long [bar1Free](#)  
*Unallocated BARI 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 nvmIeccErrorCounts\_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 [nvmIdeviceGetMemoryErrorCounter](#)

## 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 nvmlFieldValue\_t Struct Reference

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

### Data Fields

- unsigned int [fieldId](#)  
*ID of the NVML field to retrieve. This must be set before any call that uses this struct. See the constants starting with NVML\_FI\_ above.*
- unsigned int [unused](#)  
*Currently unused. This should be initialized to 0 by the caller before any API call.*
- long long [timestamp](#)  
*CPU Timestamp of this value in microseconds since 1970.*
- long long [latencyUsec](#)  
*How long this field value took to update (in usec) within NVML. This may be averaged across several fields that are serviced by the same driver call.*
- [nvmlValueType\\_t](#) [valueType](#)  
*Type of the value stored in value.*
- [nvmlReturn\\_t](#) [nvmlReturn](#)  
*Return code for retrieving this value. This must be checked before looking at value, as value is undefined if nvmlReturn != NVML\_SUCCESS.*
- [nvmlValue\\_t](#) [value](#)  
*Value for this field. This is only valid if nvmlReturn == NVML\_SUCCESS.*

### 7.7.1 Detailed Description

Information for a Field Value Sample

## 7.8 nvmlGridLicensableFeature\_t Struct Reference

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

### 7.8.1 Detailed Description

Structure to store GRID licensable features

## 7.9 nvmIHwbcEntry\_t Struct Reference

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

### 7.9.1 Detailed Description

Description of HWBC entry

## 7.10 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.*

### 7.10.1 Detailed Description

LED states for an S-class unit.

## 7.11 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.*

### 7.11.1 Detailed Description

Memory allocation information for a device.

## 7.12 nvmlNvLinkUtilizationControl\_t Struct Reference

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

### 7.12.1 Detailed Description

Struct to define the NVLINK counter controls

## 7.13 nvmlPciInfo\_t Struct Reference

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

### Data Fields

- char [busIdLegacy](#) [NVML\_DEVICE\_PCI\_BUS\_ID\_BUFFER\_V2\_SIZE]  
*The legacy tuple domain:bus:device:function PCI identifier (& NULL terminator).*
- unsigned int [domain](#)  
*The PCI domain on which the device's bus resides, 0 to 0xffffffff.*
- 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.*
- char [busId](#) [NVML\_DEVICE\_PCI\_BUS\_ID\_BUFFER\_SIZE]  
*The tuple domain:bus:device:function PCI identifier (& NULL terminator).*

### 7.13.1 Detailed Description

PCI information about a GPU device.

## 7.14 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.*

### 7.14.1 Detailed Description

Information about running compute processes on the GPU

## 7.15 nvmlProcessUtilizationSample\_t Struct Reference

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

### Data Fields

- unsigned int [pid](#)  
*PID of process.*
- unsigned long long [timeStamp](#)  
*CPU Timestamp in microseconds.*
- unsigned int [smUtil](#)  
*SM (3D/Compute) Util Value.*
- unsigned int [memUtil](#)  
*Frame Buffer Memory Util Value.*
- unsigned int [encUtil](#)  
*Encoder Util Value.*
- unsigned int [decUtil](#)  
*Decoder Util Value.*

### 7.15.1 Detailed Description

Structure to store utilization value and process Id

## 7.16 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).*

### 7.16.1 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

## 7.17 nvmlSample\_t Struct Reference

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

### Data Fields

- unsigned long long [timeStamp](#)  
*CPU Timestamp in microseconds.*
- [nvmlValue\\_t](#) [sampleValue](#)  
*Sample Value.*

### 7.17.1 Detailed Description

Information for Sample

## 7.18 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.*

### 7.18.1 Detailed Description

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

## 7.19 nvmUnitFanSpeeds\_t Struct Reference

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

### Data Fields

- [nvmUnitFanInfo\\_t fans](#) [24]  
*Fan speed data for each fan.*
- unsigned int [count](#)  
*Number of fans in unit.*

### 7.19.1 Detailed Description

Fan speed readings for an entire S-class unit.

## 7.20 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.*

### 7.20.1 Detailed Description

Static S-class unit info.

## 7.21 nvmUtilization\_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.*

### 7.21.1 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.

## 7.22 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.*
- signed long long [sllVal](#)  
*If the value is signed long long.*

### 7.22.1 Detailed Description

Union to represent different types of Value

## 7.23 nvmlVgpuInstanceUtilizationSample\_t Struct Reference

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

### Data Fields

- [nvmlVgpuInstance\\_t vgpuInstance](#)  
*vGPU Instance*
- unsigned long long [timeStamp](#)  
*CPU Timestamp in microseconds.*
- [nvmlValue\\_t smUtil](#)  
*SM (3D/Compute) Util Value.*
- [nvmlValue\\_t memUtil](#)  
*Frame Buffer Memory Util Value.*
- [nvmlValue\\_t encUtil](#)  
*Encoder Util Value.*
- [nvmlValue\\_t decUtil](#)  
*Decoder Util Value.*

### 7.23.1 Detailed Description

Structure to store Utilization Value and vgpuInstance

## 7.24 nvmlVgpuProcessUtilizationSample\_t Struct Reference

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

### Data Fields

- nvmlVgpuInstance\_t [vgpuInstance](#)  
*vGPU Instance*
- unsigned int [pid](#)  
*PID of process running within the vGPU VM.*
- char [processName](#) [NVML\_VGPU\_NAME\_BUFFER\_SIZE]  
*Name of process running within the vGPU VM.*
- unsigned long long [timeStamp](#)  
*CPU Timestamp in microseconds.*
- unsigned int [smUtil](#)  
*SM (3D/Compute) Util Value.*
- unsigned int [memUtil](#)  
*Frame Buffer Memory Util Value.*
- unsigned int [encUtil](#)  
*Encoder Util Value.*
- unsigned int [decUtil](#)  
*Decoder Util Value.*

### 7.24.1 Detailed Description

Structure to store Utilization Value, vgpuInstance and subprocess information

## 7.25 nvmIViolationTime\_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*

### 7.25.1 Detailed Description

Struct to hold perf policy violation status data

# Index

Accounting Statistics, [37](#)

Constants, [48](#)

Device Commands, [105](#)

Device Enums, [19](#)

Device Queries, [55](#)

Device Structs, [15](#)

Drain states, [122](#)

Encoder Structs, [44](#)

Error reporting, [47](#)

Event Handling Methods, [118](#)

Event Types, [35](#)

Field Value Enums, [28](#)

Field Value Queries, [125](#)

Grid Commands, [127](#)

GRID Enums, [27](#)

Grid Queries, [126](#)

Initialization and Cleanup, [45](#)

NvLink

[nvmlDeviceFreezeNvLinkUtilizationCounter](#), [112](#)

[nvmlDeviceGetNvLinkCapability](#), [113](#)

[nvmlDeviceGetNvLinkErrorCounter](#), [113](#)

[nvmlDeviceGetNvLinkRemotePciInfo](#), [113](#)

[nvmlDeviceGetNvLinkState](#), [114](#)

[nvmlDeviceGetNvLinkUtilizationControl](#), [114](#)

[nvmlDeviceGetNvLinkUtilizationCounter](#), [115](#)

[nvmlDeviceGetNvLinkVersion](#), [115](#)

[nvmlDeviceResetNvLinkErrorCounters](#), [116](#)

[nvmlDeviceResetNvLinkUtilizationCounter](#), [116](#)

[nvmlDeviceSetNvLinkUtilizationControl](#), [116](#)

NvLink Methods, [112](#)

NVML\_AGGREGATE\_ECC

[nvmlDeviceEnumvs](#), [23](#)

NVML\_CLOCK\_GRAPHICS

[nvmlDeviceEnumvs](#), [22](#)

NVML\_CLOCK\_ID\_APP\_CLOCK\_DEFAULT

[nvmlDeviceEnumvs](#), [22](#)

NVML\_CLOCK\_ID\_APP\_CLOCK\_TARGET

[nvmlDeviceEnumvs](#), [22](#)

NVML\_CLOCK\_ID\_CURRENT

[nvmlDeviceEnumvs](#), [22](#)

NVML\_CLOCK\_ID\_CUSTOMER\_BOOST\_MAX

[nvmlDeviceEnumvs](#), [22](#)

NVML\_CLOCK\_MEM

[nvmlDeviceEnumvs](#), [22](#)

NVML\_CLOCK\_SM

[nvmlDeviceEnumvs](#), [22](#)

NVML\_CLOCK\_VIDEO

[nvmlDeviceEnumvs](#), [22](#)

NVML\_COMPUTEMODE\_DEFAULT

[nvmlDeviceEnumvs](#), [22](#)

NVML\_COMPUTEMODE\_EXCLUSIVE\_PROCESS

[nvmlDeviceEnumvs](#), [22](#)

NVML\_COMPUTEMODE\_EXCLUSIVE\_THREAD

[nvmlDeviceEnumvs](#), [22](#)

NVML\_COMPUTEMODE\_PROHIBITED

[nvmlDeviceEnumvs](#), [22](#)

NVML\_DEC\_UTILIZATION\_SAMPLES

[nvmlDeviceStructs](#), [18](#)

NVML\_DRIVER\_WDDM

[nvmlDeviceEnumvs](#), [23](#)

NVML\_DRIVER\_WDM

[nvmlDeviceEnumvs](#), [23](#)

NVML\_ECC\_COUNTER\_TYPE\_COUNT

[nvmlDeviceEnumvs](#), [23](#)

NVML\_ENC\_UTILIZATION\_SAMPLES

[nvmlDeviceStructs](#), [18](#)

NVML\_ERROR\_ALREADY\_INITIALIZED

[nvmlDeviceEnumvs](#), [25](#)

NVML\_ERROR\_CORRUPTED\_INFOROM

[nvmlDeviceEnumvs](#), [26](#)

NVML\_ERROR\_DRIVER\_NOT\_LOADED

[nvmlDeviceEnumvs](#), [26](#)

NVML\_ERROR\_FUNCTION\_NOT\_FOUND

[nvmlDeviceEnumvs](#), [26](#)

NVML\_ERROR\_GPU\_IS\_LOST

[nvmlDeviceEnumvs](#), [26](#)

NVML\_ERROR\_IN\_USE

[nvmlDeviceEnumvs](#), [26](#)

NVML\_ERROR\_INSUFFICIENT\_POWER

[nvmlDeviceEnumvs](#), [26](#)

NVML\_ERROR\_INSUFFICIENT\_SIZE

[nvmlDeviceEnumvs](#), [26](#)

NVML\_ERROR\_INVALID\_ARGUMENT

[nvmlDeviceEnumvs](#), [25](#)

- NVML\_ERROR\_IRQ\_ISSUE
  - nvmlDeviceEnumvs, 26
- NVML\_ERROR\_LIB\_RM\_VERSION\_MISMATCH
  - nvmlDeviceEnumvs, 26
- NVML\_ERROR\_LIBRARY\_NOT\_FOUND
  - nvmlDeviceEnumvs, 26
- NVML\_ERROR\_MEMORY
  - nvmlDeviceEnumvs, 26
- NVML\_ERROR\_NO\_DATA
  - nvmlDeviceEnumvs, 26
- NVML\_ERROR\_NO\_PERMISSION
  - nvmlDeviceEnumvs, 25
- NVML\_ERROR\_NOT\_FOUND
  - nvmlDeviceEnumvs, 26
- NVML\_ERROR\_NOT\_SUPPORTED
  - nvmlDeviceEnumvs, 25
- NVML\_ERROR\_OPERATING\_SYSTEM
  - nvmlDeviceEnumvs, 26
- NVML\_ERROR\_RESET\_REQUIRED
  - nvmlDeviceEnumvs, 26
- NVML\_ERROR\_TIMEOUT
  - nvmlDeviceEnumvs, 26
- NVML\_ERROR\_UNINITIALIZED
  - nvmlDeviceEnumvs, 25
- NVML\_ERROR\_UNKNOWN
  - nvmlDeviceEnumvs, 26
- NVML\_ERROR\_VGPU\_ECC\_NOT\_SUPPORTED
  - nvmlDeviceEnumvs, 26
- NVML\_FAN\_FAILED
  - nvmlUnitStructs, 34
- NVML\_FAN\_NORMAL
  - nvmlUnitStructs, 34
- NVML\_FEATURE\_DISABLED
  - nvmlDeviceEnumvs, 23
- NVML\_FEATURE\_ENABLED
  - nvmlDeviceEnumvs, 23
- NVML\_GOM\_ALL\_ON
  - nvmlDeviceEnumvs, 23
- NVML\_GOM\_COMPUTE
  - nvmlDeviceEnumvs, 23
- NVML\_GOM\_LOW\_DP
  - nvmlDeviceEnumvs, 23
- NVML\_GPU\_UTILIZATION\_SAMPLES
  - nvmlDeviceStructs, 18
- NVML\_GPU\_VIRTUALIZATION\_MODE\_HOST\_-
 VGPU
  - nvmlGridEnums, 27
- NVML\_GPU\_VIRTUALIZATION\_MODE\_HOST\_-
 VSGA
  - nvmlGridEnums, 27
- NVML\_GPU\_VIRTUALIZATION\_MODE\_NONE
  - nvmlGridEnums, 27
- NVML\_GPU\_VIRTUALIZATION\_MODE\_-
 PASSTHROUGH
  - nvmlGridEnums, 27
- NVML\_GPU\_VIRTUALIZATION\_MODE\_VGPU
  - nvmlGridEnums, 27
- NVML\_INFOROM\_COUNT
  - nvmlDeviceEnumvs, 24
- NVML\_INFOROM\_ECC
  - nvmlDeviceEnumvs, 24
- NVML\_INFOROM\_OEM
  - nvmlDeviceEnumvs, 24
- NVML\_INFOROM\_POWER
  - nvmlDeviceEnumvs, 24
- NVML\_LED\_COLOR\_AMBER
  - nvmlUnitStructs, 34
- NVML\_LED\_COLOR\_GREEN
  - nvmlUnitStructs, 34
- NVML\_MEMORY\_CLK\_SAMPLES
  - nvmlDeviceStructs, 18
- NVML\_MEMORY\_ERROR\_TYPE\_CORRECTED
  - nvmlDeviceEnumvs, 24
- NVML\_MEMORY\_ERROR\_TYPE\_COUNT
  - nvmlDeviceEnumvs, 24
- NVML\_MEMORY\_ERROR\_TYPE\_UNCORRECTED
  - nvmlDeviceEnumvs, 24
- NVML\_MEMORY\_LOCATION\_CBU
  - nvmlDeviceEnumvs, 24
- NVML\_MEMORY\_LOCATION\_COUNT
  - nvmlDeviceEnumvs, 24
- NVML\_MEMORY\_LOCATION\_DEVICE\_MEMORY
  - nvmlDeviceEnumvs, 24
- NVML\_MEMORY\_LOCATION\_L1\_CACHE
  - nvmlDeviceEnumvs, 24
- NVML\_MEMORY\_LOCATION\_L2\_CACHE
  - nvmlDeviceEnumvs, 24
- NVML\_MEMORY\_LOCATION\_REGISTER\_FILE
  - nvmlDeviceEnumvs, 24
- NVML\_MEMORY\_LOCATION\_TEXTURE\_-
 MEMORY
  - nvmlDeviceEnumvs, 24
- NVML\_MEMORY\_LOCATION\_TEXTURE\_SHM
  - nvmlDeviceEnumvs, 24
- NVML\_MEMORY\_UTILIZATION\_SAMPLES
  - nvmlDeviceStructs, 18
- NVML\_PAGE\_RETIREMENT\_CAUSE\_DOUBLE\_-
 BIT\_ECC\_ERROR
  - nvmlDeviceEnumvs, 24
- NVML\_PAGE\_RETIREMENT\_CAUSE\_MULTIPLE\_-
 SINGLE\_BIT\_ECC\_ERRORS
  - nvmlDeviceEnumvs, 24
- NVML\_PERF\_POLICY\_BOARD\_LIMIT
  - nvmlDeviceStructs, 17
- NVML\_PERF\_POLICY\_LOW\_UTILIZATION
  - nvmlDeviceStructs, 17
- NVML\_PERF\_POLICY\_POWER
  - nvmlDeviceStructs, 17

- NVML\_PERF\_POLICY\_RELIABILITY
  - nvmlDeviceStructs, [17](#)
- NVML\_PERF\_POLICY\_SYNC\_BOOST
  - nvmlDeviceStructs, [17](#)
- NVML\_PERF\_POLICY\_THERMAL
  - nvmlDeviceStructs, [17](#)
- NVML\_PERF\_POLICY\_TOTAL\_APP\_CLOCKS
  - nvmlDeviceStructs, [18](#)
- NVML\_PERF\_POLICY\_TOTAL\_BASE\_CLOCKS
  - nvmlDeviceStructs, [18](#)
- NVML\_PROCESSOR\_CLK\_SAMPLES
  - nvmlDeviceStructs, [18](#)
- NVML\_PSTATE\_0
  - nvmlDeviceEnumvs, [25](#)
- NVML\_PSTATE\_1
  - nvmlDeviceEnumvs, [25](#)
- NVML\_PSTATE\_10
  - nvmlDeviceEnumvs, [25](#)
- NVML\_PSTATE\_11
  - nvmlDeviceEnumvs, [25](#)
- NVML\_PSTATE\_12
  - nvmlDeviceEnumvs, [25](#)
- NVML\_PSTATE\_13
  - nvmlDeviceEnumvs, [25](#)
- NVML\_PSTATE\_14
  - nvmlDeviceEnumvs, [25](#)
- NVML\_PSTATE\_15
  - nvmlDeviceEnumvs, [25](#)
- NVML\_PSTATE\_2
  - nvmlDeviceEnumvs, [25](#)
- NVML\_PSTATE\_3
  - nvmlDeviceEnumvs, [25](#)
- NVML\_PSTATE\_4
  - nvmlDeviceEnumvs, [25](#)
- NVML\_PSTATE\_5
  - nvmlDeviceEnumvs, [25](#)
- NVML\_PSTATE\_6
  - nvmlDeviceEnumvs, [25](#)
- NVML\_PSTATE\_7
  - nvmlDeviceEnumvs, [25](#)
- NVML\_PSTATE\_8
  - nvmlDeviceEnumvs, [25](#)
- NVML\_PSTATE\_9
  - nvmlDeviceEnumvs, [25](#)
- NVML\_PSTATE\_UNKNOWN
  - nvmlDeviceEnumvs, [25](#)
- NVML\_RESTRICTED\_API\_SET\_APPLICATION\_-
  - CLOCKS
    - nvmlDeviceEnumvs, [25](#)
- NVML\_RESTRICTED\_API\_SET\_AUTO\_-
  - BOOSTED\_CLOCKS
    - nvmlDeviceEnumvs, [25](#)
- NVML\_SUCCESS
  - nvmlDeviceEnumvs, [25](#)
- NVML\_TEMPERATURE\_GPU
  - nvmlDeviceEnumvs, [26](#)
- NVML\_TOTAL\_POWER\_SAMPLES
  - nvmlDeviceStructs, [18](#)
- NVML\_VGPU\_VM\_ID\_DOMAIN\_ID
  - nvmlVgpuEnum, [42](#)
- NVML\_VGPU\_VM\_ID\_UUID
  - nvmlVgpuEnum, [42](#)
- NVML\_VOLATILE\_ECC
  - nvmlDeviceEnumvs, [23](#)
- NVML\_DEVICE\_INFOROM\_VERSION\_BUFFER\_-
  - SIZE
    - nvmlConstants, [48](#)
- NVML\_DEVICE\_NAME\_BUFFER\_SIZE
  - nvmlConstants, [48](#)
- NVML\_DEVICE\_PART\_NUMBER\_BUFFER\_SIZE
  - nvmlConstants, [48](#)
- NVML\_DEVICE\_PCI\_BUS\_ID\_BUFFER\_SIZE
  - nvmlDeviceStructs, [16](#)
- NVML\_DEVICE\_PCI\_BUS\_ID\_BUFFER\_V2\_SIZE
  - nvmlDeviceStructs, [16](#)
- NVML\_DEVICE\_SERIAL\_BUFFER\_SIZE
  - nvmlConstants, [48](#)
- NVML\_DEVICE\_UUID\_BUFFER\_SIZE
  - nvmlConstants, [48](#)
- NVML\_DEVICE\_VBIOS\_VERSION\_BUFFER\_SIZE
  - nvmlConstants, [48](#)
- NVML\_DOUBLE\_BIT\_ECC
  - nvmlDeviceEnumvs, [21](#)
- NVML\_FI\_DEV\_ECC\_CURRENT
  - nvmlFieldValueEnums, [33](#)
- NVML\_GRID\_LICENSE\_BUFFER\_SIZE
  - nvmlVgpuConstants, [41](#)
- NVML\_MAX\_PHYSICAL\_BRIDGE
  - nvmlDeviceStructs, [16](#)
- NVML\_NVLINK\_MAX\_LINKS
  - nvmlDeviceStructs, [16](#)
- NVML\_SINGLE\_BIT\_ECC
  - nvmlDeviceEnumvs, [21](#)
- NVML\_SYSTEM\_DRIVER\_VERSION\_BUFFER\_-
  - SIZE
    - nvmlConstants, [48](#)
- NVML\_SYSTEM\_NVML\_VERSION\_BUFFER\_SIZE
  - nvmlConstants, [48](#)
- NVML\_VALUE\_NOT\_AVAILABLE
  - nvmlDeviceStructs, [16](#)
- nvmlAccountingStats
  - nvmlDeviceClearAccountingPids, [37](#)
  - nvmlDeviceGetAccountingBufferSize, [37](#)
  - nvmlDeviceGetAccountingMode, [38](#)
  - nvmlDeviceGetAccountingPids, [38](#)
  - nvmlDeviceGetAccountingStats, [39](#)
  - nvmlDeviceSetAccountingMode, [40](#)
- nvmlAccountingStats\_t, [147](#)

- nvmlBAR1Memory\_t, 149
- nvmlBrandType\_t
  - nvmlDeviceEnumvs, 22
- nvmlBridgeChipHierarchy\_t, 150
- nvmlBridgeChipInfo\_t, 151
- nvmlBridgeChipType\_t
  - nvmlDeviceStructs, 17
- nvmlClockId\_t
  - nvmlDeviceEnumvs, 22
- nvmlClocksThrottleReasonAll
  - nvmlClocksThrottleReasons, 143
- nvmlClocksThrottleReasonApplicationsClocksSetting
  - nvmlClocksThrottleReasons, 143
- nvmlClocksThrottleReasonGpuIdle
  - nvmlClocksThrottleReasons, 143
- nvmlClocksThrottleReasonHwPowerBrakeSlowdown
  - nvmlClocksThrottleReasons, 143
- nvmlClocksThrottleReasonHwSlowdown
  - nvmlClocksThrottleReasons, 144
- nvmlClocksThrottleReasonHwThermalSlowdown
  - nvmlClocksThrottleReasons, 144
- nvmlClocksThrottleReasonNone
  - nvmlClocksThrottleReasons, 144
- NvmlClocksThrottleReasons, 143
- nvmlClocksThrottleReasons
  - nvmlClocksThrottleReasonAll, 143
  - nvmlClocksThrottleReasonApplicationsClocksSetting, 143
  - nvmlClocksThrottleReasonGpuIdle, 143
  - nvmlClocksThrottleReasonHwPowerBrakeSlowdown, 143
  - nvmlClocksThrottleReasonHwSlowdown, 144
  - nvmlClocksThrottleReasonHwThermalSlowdown, 144
  - nvmlClocksThrottleReasonNone, 144
  - nvmlClocksThrottleReasonSwPowerCap, 144
  - nvmlClocksThrottleReasonSwThermalSlowdown, 145
  - nvmlClocksThrottleReasonSyncBoost, 145
  - nvmlClocksThrottleReasonUserDefinedClocks, 145
- nvmlClocksThrottleReasonSwPowerCap
  - nvmlClocksThrottleReasons, 144
- nvmlClocksThrottleReasonSwThermalSlowdown
  - nvmlClocksThrottleReasons, 145
- nvmlClocksThrottleReasonSyncBoost
  - nvmlClocksThrottleReasons, 145
- nvmlClocksThrottleReasonUserDefinedClocks
  - nvmlClocksThrottleReasons, 145
- nvmlClockType\_t
  - nvmlDeviceEnumvs, 22
- nvmlComputeMode\_t
  - nvmlDeviceEnumvs, 22
- nvmlConstants
  - NVML\_DEVICE\_INFOROM\_VERSION\_BUFFER\_SIZE, 48
  - NVML\_DEVICE\_NAME\_BUFFER\_SIZE, 48
  - NVML\_DEVICE\_PART\_NUMBER\_BUFFER\_SIZE, 48
  - NVML\_DEVICE\_SERIAL\_BUFFER\_SIZE, 48
  - NVML\_DEVICE\_UUID\_BUFFER\_SIZE, 48
  - NVML\_DEVICE\_VBIOS\_VERSION\_BUFFER\_SIZE, 48
  - NVML\_SYSTEM\_DRIVER\_VERSION\_BUFFER\_SIZE, 48
  - NVML\_SYSTEM\_NVML\_VERSION\_BUFFER\_SIZE, 48
- nvmlDeviceClearAccountingPids
  - nvmlAccountingStats, 37
- nvmlDeviceClearCpuAffinity
  - nvmlDeviceQueries, 58
- nvmlDeviceClearEccErrorCounts
  - nvmlDeviceCommands, 105
- nvmlDeviceCommands
  - nvmlDeviceClearEccErrorCounts, 105
  - nvmlDeviceSetAPIRestriction, 106
  - nvmlDeviceSetApplicationsClocks, 106
  - nvmlDeviceSetComputeMode, 107
  - nvmlDeviceSetDriverModel, 108
  - nvmlDeviceSetEccMode, 108
  - nvmlDeviceSetGpuOperationMode, 109
  - nvmlDeviceSetPersistenceMode, 110
  - nvmlDeviceSetPowerManagementLimit, 110
- nvmlDeviceDiscoverGpus
  - nvmlZPI, 122
- nvmlDeviceEnumvs
  - NVML\_AGGREGATE\_ECC, 23
  - NVML\_CLOCK\_GRAPHICS, 22
  - NVML\_CLOCK\_ID\_APP\_CLOCK\_DEFAULT, 22
  - NVML\_CLOCK\_ID\_APP\_CLOCK\_TARGET, 22
  - NVML\_CLOCK\_ID\_CURRENT, 22
  - NVML\_CLOCK\_ID\_CUSTOMER\_BOOST\_MAX, 22
  - NVML\_CLOCK\_MEM, 22
  - NVML\_CLOCK\_SM, 22
  - NVML\_CLOCK\_VIDEO, 22
  - NVML\_COMPUTEMODE\_DEFAULT, 22
  - NVML\_COMPUTEMODE\_EXCLUSIVE\_PROCESS, 22
  - NVML\_COMPUTEMODE\_EXCLUSIVE\_THREAD, 22
  - NVML\_COMPUTEMODE\_PROHIBITED, 22
  - NVML\_DRIVER\_WDDM, 23
  - NVML\_DRIVER\_WDM, 23
  - NVML\_ECC\_COUNTER\_TYPE\_COUNT, 23
  - NVML\_ERROR\_ALREADY\_INITIALIZED, 25
  - NVML\_ERROR\_CORRUPTED\_INFOROM, 26
  - NVML\_ERROR\_DRIVER\_NOT\_LOADED, 26

- NVML\_ERROR\_FUNCTION\_NOT\_FOUND, 26
- NVML\_ERROR\_GPU\_IS\_LOST, 26
- NVML\_ERROR\_IN\_USE, 26
- NVML\_ERROR\_INSUFFICIENT\_POWER, 26
- NVML\_ERROR\_INSUFFICIENT\_SIZE, 26
- NVML\_ERROR\_INVALID\_ARGUMENT, 25
- NVML\_ERROR\_IRQ\_ISSUE, 26
- NVML\_ERROR\_LIB\_RM\_VERSION\_-  
MISMATCH, 26
- NVML\_ERROR\_LIBRARY\_NOT\_FOUND, 26
- NVML\_ERROR\_MEMORY, 26
- NVML\_ERROR\_NO\_DATA, 26
- NVML\_ERROR\_NO\_PERMISSION, 25
- NVML\_ERROR\_NOT\_FOUND, 26
- NVML\_ERROR\_NOT\_SUPPORTED, 25
- NVML\_ERROR\_OPERATING\_SYSTEM, 26
- NVML\_ERROR\_RESET\_REQUIRED, 26
- NVML\_ERROR\_TIMEOUT, 26
- NVML\_ERROR\_UNINITIALIZED, 25
- NVML\_ERROR\_UNKNOWN, 26
- NVML\_ERROR\_VGPU\_ECC\_NOT\_-  
SUPPORTED, 26
- NVML\_FEATURE\_DISABLED, 23
- NVML\_FEATURE\_ENABLED, 23
- NVML\_GOM\_ALL\_ON, 23
- NVML\_GOM\_COMPUTE, 23
- NVML\_GOM\_LOW\_DP, 23
- NVML\_INFOROM\_COUNT, 24
- NVML\_INFOROM\_ECC, 24
- NVML\_INFOROM\_OEM, 24
- NVML\_INFOROM\_POWER, 24
- NVML\_MEMORY\_ERROR\_TYPE\_-  
CORRECTED, 24
- NVML\_MEMORY\_ERROR\_TYPE\_COUNT, 24
- NVML\_MEMORY\_ERROR\_TYPE\_-  
UNCORRECTED, 24
- NVML\_MEMORY\_LOCATION\_CBU, 24
- NVML\_MEMORY\_LOCATION\_COUNT, 24
- NVML\_MEMORY\_LOCATION\_DEVICE\_-  
MEMORY, 24
- NVML\_MEMORY\_LOCATION\_L1\_CACHE, 24
- NVML\_MEMORY\_LOCATION\_L2\_CACHE, 24
- NVML\_MEMORY\_LOCATION\_REGISTER\_-  
FILE, 24
- NVML\_MEMORY\_LOCATION\_TEXTURE\_-  
MEMORY, 24
- NVML\_MEMORY\_LOCATION\_TEXTURE\_-  
SHM, 24
- NVML\_PAGE\_RETIREMENT\_CAUSE\_-  
DOUBLE\_BIT\_ECC\_ERROR, 24
- NVML\_PAGE\_RETIREMENT\_CAUSE\_-  
MULTIPLE\_SINGLE\_BIT\_ECC\_ERRORS,  
24
- NVML\_PSTATE\_0, 25
- NVML\_PSTATE\_1, 25
- NVML\_PSTATE\_10, 25
- NVML\_PSTATE\_11, 25
- NVML\_PSTATE\_12, 25
- NVML\_PSTATE\_13, 25
- NVML\_PSTATE\_14, 25
- NVML\_PSTATE\_15, 25
- NVML\_PSTATE\_2, 25
- NVML\_PSTATE\_3, 25
- NVML\_PSTATE\_4, 25
- NVML\_PSTATE\_5, 25
- NVML\_PSTATE\_6, 25
- NVML\_PSTATE\_7, 25
- NVML\_PSTATE\_8, 25
- NVML\_PSTATE\_9, 25
- NVML\_PSTATE\_UNKNOWN, 25
- NVML\_RESTRICTED\_API\_SET\_-  
APPLICATION\_CLOCKS, 25
- NVML\_RESTRICTED\_API\_SET\_AUTO\_-  
BOOSTED\_CLOCKS, 25
- NVML\_SUCCESS, 25
- NVML\_TEMPERATURE\_GPU, 26
- NVML\_VOLATILE\_ECC, 23
- NVML\_DOUBLE\_BIT\_ECC, 21
- NVML\_SINGLE\_BIT\_ECC, 21
- nvmlBrandType\_t, 22
- nvmlClockId\_t, 22
- nvmlClockType\_t, 22
- nvmlComputeMode\_t, 22
- nvmlDriverModel\_t, 22
- nvmlEccBitType\_t, 21
- nvmlEccCounterType\_t, 23
- nvmlEnableState\_t, 23
- nvmlGpuOperationMode\_t, 23
- nvmlInforomObject\_t, 23
- nvmlMemoryErrorType\_t, 24
- nvmlMemoryLocation\_t, 24
- nvmlPageRetirementCause\_t, 24
- nvmlPstates\_t, 24
- nvmlRestrictedAPI\_t, 25
- nvmlReturn\_t, 25
- nvmlTemperatureSensors\_t, 26
- nvmlTemperatureThresholds\_t, 26
- nvmlDeviceFreezeNvLinkUtilizationCounter  
NvLink, 112
- nvmlDeviceGetAccountingBufferSize  
nvmlAccountingStats, 37
- nvmlDeviceGetAccountingMode  
nvmlAccountingStats, 38
- nvmlDeviceGetAccountingPids  
nvmlAccountingStats, 38
- nvmlDeviceGetAccountingStats  
nvmlAccountingStats, 39
- nvmlDeviceGetActiveVgpus

- nvmlVgpu, 129
- nvmlDeviceGetAPIRestriction
  - nvmlDeviceQueries, 58
- nvmlDeviceGetApplicationsClock
  - nvmlDeviceQueries, 58
- nvmlDeviceGetAutoBoostedClocksEnabled
  - nvmlDeviceQueries, 59
- nvmlDeviceGetBAR1MemoryInfo
  - nvmlDeviceQueries, 59
- nvmlDeviceGetBoardId
  - nvmlDeviceQueries, 60
- nvmlDeviceGetBoardPartNumber
  - nvmlDeviceQueries, 60
- nvmlDeviceGetBrand
  - nvmlDeviceQueries, 61
- nvmlDeviceGetBridgeChipInfo
  - nvmlDeviceQueries, 61
- nvmlDeviceGetClock
  - nvmlDeviceQueries, 62
- nvmlDeviceGetClockInfo
  - nvmlDeviceQueries, 62
- nvmlDeviceGetComputeMode
  - nvmlDeviceQueries, 63
- nvmlDeviceGetComputeRunningProcesses
  - nvmlDeviceQueries, 63
- nvmlDeviceGetCount
  - nvmlDeviceQueries, 64
- nvmlDeviceGetCpuAffinity
  - nvmlDeviceQueries, 64
- nvmlDeviceGetCreatableVgpus
  - nvmlVgpu, 129
- nvmlDeviceGetCudaComputeCapability
  - nvmlDeviceQueries, 65
- nvmlDeviceGetCurrentClocksThrottleReasons
  - nvmlDeviceQueries, 65
- nvmlDeviceGetCurrPcieLinkGeneration
  - nvmlDeviceQueries, 66
- nvmlDeviceGetCurrPcieLinkWidth
  - nvmlDeviceQueries, 66
- nvmlDeviceGetDecoderUtilization
  - nvmlDeviceQueries, 67
- nvmlDeviceGetDefaultApplicationsClock
  - nvmlDeviceQueries, 67
- nvmlDeviceGetDetailedEccErrors
  - nvmlDeviceQueries, 68
- nvmlDeviceGetDisplayActive
  - nvmlDeviceQueries, 68
- nvmlDeviceGetDisplayMode
  - nvmlDeviceQueries, 69
- nvmlDeviceGetDriverModel
  - nvmlDeviceQueries, 69
- nvmlDeviceGetEccMode
  - nvmlDeviceQueries, 70
- nvmlDeviceGetEncoderCapacity
  - nvmlDeviceQueries, 71
- nvmlDeviceGetEncoderSessions
  - nvmlDeviceQueries, 71
- nvmlDeviceGetEncoderStats
  - nvmlDeviceQueries, 72
- nvmlDeviceGetEncoderUtilization
  - nvmlDeviceQueries, 72
- nvmlDeviceGetEnforcedPowerLimit
  - nvmlDeviceQueries, 73
- nvmlDeviceGetFanSpeed
  - nvmlDeviceQueries, 73
- nvmlDeviceGetFieldValues
  - nvmlFieldValueQueries, 125
- nvmlDeviceGetGpuOperationMode
  - nvmlDeviceQueries, 74
- nvmlDeviceGetGraphicsRunningProcesses
  - nvmlDeviceQueries, 74
- nvmlDeviceGetGridLicensableFeatures
  - nvmlVgpu, 130
- nvmlDeviceGetHandleByIndex
  - nvmlDeviceQueries, 75
- nvmlDeviceGetHandleByPciBusId
  - nvmlDeviceQueries, 76
- nvmlDeviceGetHandleBySerial
  - nvmlDeviceQueries, 76
- nvmlDeviceGetHandleByUUID
  - nvmlDeviceQueries, 77
- nvmlDeviceGetIndex
  - nvmlDeviceQueries, 78
- nvmlDeviceGetInforomConfigurationChecksum
  - nvmlDeviceQueries, 78
- nvmlDeviceGetInforomImageVersion
  - nvmlDeviceQueries, 79
- nvmlDeviceGetInforomVersion
  - nvmlDeviceQueries, 80
- nvmlDeviceGetMaxClockInfo
  - nvmlDeviceQueries, 80
- nvmlDeviceGetMaxCustomerBoostClock
  - nvmlDeviceQueries, 81
- nvmlDeviceGetMaxPcieLinkGeneration
  - nvmlDeviceQueries, 81
- nvmlDeviceGetMaxPcieLinkWidth
  - nvmlDeviceQueries, 82
- nvmlDeviceGetMemoryErrorCounter
  - nvmlDeviceQueries, 82
- nvmlDeviceGetMemoryInfo
  - nvmlDeviceQueries, 83
- nvmlDeviceGetMinorNumber
  - nvmlDeviceQueries, 83
- nvmlDeviceGetMultiGpuBoard
  - nvmlDeviceQueries, 84
- nvmlDeviceGetName
  - nvmlDeviceQueries, 84
- nvmlDeviceGetNvLinkCapability

- NvLink, [113](#)
- `nvmlDeviceGetNvLinkErrorCounter`
  - NvLink, [113](#)
- `nvmlDeviceGetNvLinkRemotePciInfo`
  - NvLink, [113](#)
- `nvmlDeviceGetNvLinkState`
  - NvLink, [114](#)
- `nvmlDeviceGetNvLinkUtilizationControl`
  - NvLink, [114](#)
- `nvmlDeviceGetNvLinkUtilizationCounter`
  - NvLink, [115](#)
- `nvmlDeviceGetNvLinkVersion`
  - NvLink, [115](#)
- `nvmlDeviceGetP2PStatus`
  - `nvmlDeviceQueries`, [85](#)
- `nvmlDeviceGetPcieReplayCounter`
  - `nvmlDeviceQueries`, [85](#)
- `nvmlDeviceGetPcieThroughput`
  - `nvmlDeviceQueries`, [86](#)
- `nvmlDeviceGetPciInfo`
  - `nvmlDeviceQueries`, [86](#)
- `nvmlDeviceGetPerformanceState`
  - `nvmlDeviceQueries`, [86](#)
- `nvmlDeviceGetPersistenceMode`
  - `nvmlDeviceQueries`, [87](#)
- `nvmlDeviceGetPowerManagementDefaultLimit`
  - `nvmlDeviceQueries`, [87](#)
- `nvmlDeviceGetPowerManagementLimit`
  - `nvmlDeviceQueries`, [88](#)
- `nvmlDeviceGetPowerManagementLimitConstraints`
  - `nvmlDeviceQueries`, [88](#)
- `nvmlDeviceGetPowerManagementMode`
  - `nvmlDeviceQueries`, [89](#)
- `nvmlDeviceGetPowerState`
  - `nvmlDeviceQueries`, [90](#)
- `nvmlDeviceGetPowerUsage`
  - `nvmlDeviceQueries`, [90](#)
- `nvmlDeviceGetProcessUtilization`
  - `nvmlVgpu`, [130](#)
- `nvmlDeviceGetRetiredPages`
  - `nvmlDeviceQueries`, [90](#)
- `nvmlDeviceGetRetiredPagesPendingStatus`
  - `nvmlDeviceQueries`, [91](#)
- `nvmlDeviceGetSamples`
  - `nvmlDeviceQueries`, [91](#)
- `nvmlDeviceGetSerial`
  - `nvmlDeviceQueries`, [92](#)
- `nvmlDeviceGetSupportedClocksThrottleReasons`
  - `nvmlDeviceQueries`, [93](#)
- `nvmlDeviceGetSupportedEventTypes`
  - `nvmlEvents`, [118](#)
- `nvmlDeviceGetSupportedGraphicsClocks`
  - `nvmlDeviceQueries`, [93](#)
- `nvmlDeviceGetSupportedMemoryClocks`
  - `nvmlDeviceQueries`, [94](#)
- `nvmlDeviceGetSupportedVgpus`
  - `nvmlVgpu`, [131](#)
- `nvmlDeviceGetTemperature`
  - `nvmlDeviceQueries`, [94](#)
- `nvmlDeviceGetTemperatureThreshold`
  - `nvmlDeviceQueries`, [95](#)
- `nvmlDeviceGetTopologyCommonAncestor`
  - `nvmlDeviceQueries`, [95](#)
- `nvmlDeviceGetTopologyNearestGpus`
  - `nvmlDeviceQueries`, [96](#)
- `nvmlDeviceGetTotalEccErrors`
  - `nvmlDeviceQueries`, [96](#)
- `nvmlDeviceGetTotalEnergyConsumption`
  - `nvmlDeviceQueries`, [97](#)
- `nvmlDeviceGetUtilizationRates`
  - `nvmlDeviceQueries`, [97](#)
- `nvmlDeviceGetUUID`
  - `nvmlDeviceQueries`, [98](#)
- `nvmlDeviceGetVbiosVersion`
  - `nvmlDeviceQueries`, [98](#)
- `nvmlDeviceGetVgpuProcessUtilization`
  - `nvmlVgpu`, [132](#)
- `nvmlDeviceGetVgpuUtilization`
  - `nvmlVgpu`, [133](#)
- `nvmlDeviceGetViolationStatus`
  - `nvmlDeviceQueries`, [99](#)
- `nvmlDeviceGetVirtualizationMode`
  - `nvmlGridQueries`, [126](#)
- `nvmlDeviceModifyDrainState`
  - `nvmlZPI`, [122](#)
- `nvmlDeviceOnSameBoard`
  - `nvmlDeviceQueries`, [99](#)
- `nvmlDeviceQueries`
  - `nvmlDeviceClearCpuAffinity`, [58](#)
  - `nvmlDeviceGetAPIRestriction`, [58](#)
  - `nvmlDeviceGetApplicationsClock`, [58](#)
  - `nvmlDeviceGetAutoBoostedClocksEnabled`, [59](#)
  - `nvmlDeviceGetBAR1MemoryInfo`, [59](#)
  - `nvmlDeviceGetBoardId`, [60](#)
  - `nvmlDeviceGetBoardPartNumber`, [60](#)
  - `nvmlDeviceGetBrand`, [61](#)
  - `nvmlDeviceGetBridgeChipInfo`, [61](#)
  - `nvmlDeviceGetClock`, [62](#)
  - `nvmlDeviceGetClockInfo`, [62](#)
  - `nvmlDeviceGetComputeMode`, [63](#)
  - `nvmlDeviceGetComputeRunningProcesses`, [63](#)
  - `nvmlDeviceGetCount`, [64](#)
  - `nvmlDeviceGetCpuAffinity`, [64](#)
  - `nvmlDeviceGetCudaComputeCapability`, [65](#)
  - `nvmlDeviceGetCurrentClocksThrottleReasons`, [65](#)
  - `nvmlDeviceGetCurrPcieLinkGeneration`, [66](#)
  - `nvmlDeviceGetCurrPcieLinkWidth`, [66](#)
  - `nvmlDeviceGetDecoderUtilization`, [67](#)

- nvmlDeviceGetDefaultApplicationsClock, 67
- nvmlDeviceGetDetailedEccErrors, 68
- nvmlDeviceGetDisplayActive, 68
- nvmlDeviceGetDisplayMode, 69
- nvmlDeviceGetDriverModel, 69
- nvmlDeviceGetEccMode, 70
- nvmlDeviceGetEncoderCapacity, 71
- nvmlDeviceGetEncoderSessions, 71
- nvmlDeviceGetEncoderStats, 72
- nvmlDeviceGetEncoderUtilization, 72
- nvmlDeviceGetEnforcedPowerLimit, 73
- nvmlDeviceGetFanSpeed, 73
- nvmlDeviceGetGpuOperationMode, 74
- nvmlDeviceGetGraphicsRunningProcesses, 74
- nvmlDeviceGetHandleByIndex, 75
- nvmlDeviceGetHandleByPciBusId, 76
- nvmlDeviceGetHandleBySerial, 76
- nvmlDeviceGetHandleByUUID, 77
- nvmlDeviceGetIndex, 78
- nvmlDeviceGetInforomConfigurationChecksum, 78
- nvmlDeviceGetInforomImageVersion, 79
- nvmlDeviceGetInforomVersion, 80
- nvmlDeviceGetMaxClockInfo, 80
- nvmlDeviceGetMaxCustomerBoostClock, 81
- nvmlDeviceGetMaxPcieLinkGeneration, 81
- nvmlDeviceGetMaxPcieLinkWidth, 82
- nvmlDeviceGetMemoryErrorCounter, 82
- nvmlDeviceGetMemoryInfo, 83
- nvmlDeviceGetMinorNumber, 83
- nvmlDeviceGetMultiGpuBoard, 84
- nvmlDeviceGetName, 84
- nvmlDeviceGetP2PStatus, 85
- nvmlDeviceGetPcieReplayCounter, 85
- nvmlDeviceGetPcieThroughput, 86
- nvmlDeviceGetPciInfo, 86
- nvmlDeviceGetPerformanceState, 86
- nvmlDeviceGetPersistenceMode, 87
- nvmlDeviceGetPowerManagementDefaultLimit, 87
- nvmlDeviceGetPowerManagementLimit, 88
- nvmlDeviceGetPowerManagementLimitConstraints, 88
- nvmlDeviceGetPowerManagementMode, 89
- nvmlDeviceGetPowerState, 90
- nvmlDeviceGetPowerUsage, 90
- nvmlDeviceGetRetiredPages, 90
- nvmlDeviceGetRetiredPagesPendingStatus, 91
- nvmlDeviceGetSamples, 91
- nvmlDeviceGetSerial, 92
- nvmlDeviceGetSupportedClocksThrottleReasons, 93
- nvmlDeviceGetSupportedGraphicsClocks, 93
- nvmlDeviceGetSupportedMemoryClocks, 94
- nvmlDeviceGetTemperature, 94
- nvmlDeviceGetTemperatureThreshold, 95
- nvmlDeviceGetTopologyCommonAncestor, 95
- nvmlDeviceGetTopologyNearestGpus, 96
- nvmlDeviceGetTotalEccErrors, 96
- nvmlDeviceGetTotalEnergyConsumption, 97
- nvmlDeviceGetUtilizationRates, 97
- nvmlDeviceGetUUID, 98
- nvmlDeviceGetVbiosVersion, 98
- nvmlDeviceGetViolationStatus, 99
- nvmlDeviceOnSameBoard, 99
- nvmlDeviceResetApplicationsClocks, 100
- nvmlDeviceSetAutoBoostedClocksEnabled, 100
- nvmlDeviceSetCpuAffinity, 101
- nvmlDeviceSetDefaultAutoBoostedClocksEnabled, 101
- nvmlDeviceValidateInforom, 102
- nvmlSystemGetTopologyGpuSet, 102
- nvmlDeviceQueryDrainState
  - nvmlZPI, 123
- nvmlDeviceRegisterEvents
  - nvmlEvents, 119
- nvmlDeviceRemoveGpu
  - nvmlZPI, 123
- nvmlDeviceResetApplicationsClocks
  - nvmlDeviceQueries, 100
- nvmlDeviceResetNvLinkErrorCounters
  - NvLink, 116
- nvmlDeviceResetNvLinkUtilizationCounter
  - NvLink, 116
- nvmlDeviceSetAccountingMode
  - nvmlAccountingStats, 40
- nvmlDeviceSetAPIRestriction
  - nvmlDeviceCommands, 106
- nvmlDeviceSetApplicationsClocks
  - nvmlDeviceCommands, 106
- nvmlDeviceSetAutoBoostedClocksEnabled
  - nvmlDeviceQueries, 100
- nvmlDeviceSetComputeMode
  - nvmlDeviceCommands, 107
- nvmlDeviceSetCpuAffinity
  - nvmlDeviceQueries, 101
- nvmlDeviceSetDefaultAutoBoostedClocksEnabled
  - nvmlDeviceQueries, 101
- nvmlDeviceSetDriverModel
  - nvmlDeviceCommands, 108
- nvmlDeviceSetEccMode
  - nvmlDeviceCommands, 108
- nvmlDeviceSetGpuOperationMode
  - nvmlDeviceCommands, 109
- nvmlDeviceSetNvLinkUtilizationControl
  - NvLink, 116
- nvmlDeviceSetPersistenceMode
  - nvmlDeviceCommands, 110
- nvmlDeviceSetPowerManagementLimit
  - nvmlDeviceCommands, 110

- nvmlDeviceSetVirtualizationMode
  - nvmlGridCommands, [127](#)
- nvmlDeviceStructs
  - NVML\_DEC\_UTILIZATION\_SAMPLES, [18](#)
  - NVML\_ENC\_UTILIZATION\_SAMPLES, [18](#)
  - NVML\_GPU\_UTILIZATION\_SAMPLES, [18](#)
  - NVML\_MEMORY\_CLK\_SAMPLES, [18](#)
  - NVML\_MEMORY\_UTILIZATION\_SAMPLES, [18](#)
  - NVML\_PERF\_POLICY\_BOARD\_LIMIT, [17](#)
  - NVML\_PERF\_POLICY\_LOW\_UTILIZATION, [17](#)
  - NVML\_PERF\_POLICY\_POWER, [17](#)
  - NVML\_PERF\_POLICY\_RELIABILITY, [17](#)
  - NVML\_PERF\_POLICY\_SYNC\_BOOST, [17](#)
  - NVML\_PERF\_POLICY\_THERMAL, [17](#)
  - NVML\_PERF\_POLICY\_TOTAL\_APP\_CLOCKS, [18](#)
  - NVML\_PERF\_POLICY\_TOTAL\_BASE\_CLOCKS, [18](#)
  - NVML\_PROCESSOR\_CLK\_SAMPLES, [18](#)
  - NVML\_TOTAL\_POWER\_SAMPLES, [18](#)
  - NVML\_DEVICE\_PCI\_BUS\_ID\_BUFFER\_SIZE, [16](#)
  - NVML\_DEVICE\_PCI\_BUS\_ID\_BUFFER\_V2\_SIZE, [16](#)
  - NVML\_MAX\_PHYSICAL\_BRIDGE, [16](#)
  - NVML\_NVLINK\_MAX\_LINKS, [16](#)
  - NVML\_VALUE\_NOT\_AVAILABLE, [16](#)
  - nvmlBridgeChipType\_t, [17](#)
  - nvmlGpuTopologyLevel\_t, [17](#)
  - nvmlNvLinkCapability\_t, [17](#)
  - nvmlNvLinkErrorCounter\_t, [17](#)
  - nvmlNvLinkUtilizationCountPktTypes\_t, [17](#)
  - nvmlNvLinkUtilizationCountUnits\_t, [17](#)
  - nvmlPcieUtilCounter\_t, [17](#)
  - nvmlPerfPolicyType\_t, [17](#)
  - nvmlSamplingType\_t, [18](#)
  - nvmlValueType\_t, [18](#)
- nvmlDeviceValidateInforom
  - nvmlDeviceQueries, [102](#)
- nvmlDriverModel\_t
  - nvmlDeviceEnumvs, [22](#)
- nvmlEccBitType\_t
  - nvmlDeviceEnumvs, [21](#)
- nvmlEccCounterType\_t
  - nvmlDeviceEnumvs, [23](#)
- nvmlEccErrorCounts\_t, [152](#)
- nvmlEnableState\_t
  - nvmlDeviceEnumvs, [23](#)
- nvmlErrorReporting
  - nvmlErrorString, [47](#)
- nvmlErrorString
  - nvmlErrorReporting, [47](#)
- nvmlEventData\_t, [153](#)
- nvmlEvents
  - nvmlDeviceGetSupportedEventTypes, [118](#)
  - nvmlDeviceRegisterEvents, [119](#)
  - nvmlEventSet\_t, [118](#)
  - nvmlEventSetCreate, [119](#)
  - nvmlEventSetFree, [120](#)
  - nvmlEventSetWait, [120](#)
- nvmlEventSet\_t
  - nvmlEvents, [118](#)
- nvmlEventSetCreate
  - nvmlEvents, [119](#)
- nvmlEventSetFree
  - nvmlEvents, [120](#)
- nvmlEventSetWait
  - nvmlEvents, [120](#)
- nvmlEventType
  - nvmlEventTypeClock, [35](#)
  - nvmlEventTypeDoubleBitEccError, [35](#)
  - nvmlEventTypePState, [35](#)
  - nvmlEventTypeSingleBitEccError, [36](#)
- nvmlEventTypeClock
  - nvmlEventType, [35](#)
- nvmlEventTypeDoubleBitEccError
  - nvmlEventType, [35](#)
- nvmlEventTypePState
  - nvmlEventType, [35](#)
- nvmlEventTypeSingleBitEccError
  - nvmlEventType, [36](#)
- nvmlFanState\_t
  - nvmlUnitStructs, [34](#)
- nvmlFieldValue\_t, [154](#)
- nvmlFieldValueEnums
  - NVML\_FI\_DEV\_ECC\_CURRENT, [33](#)
- nvmlFieldValueQueries
  - nvmlDeviceGetFieldValues, [125](#)
- nvmlGpuOperationMode\_t
  - nvmlDeviceEnumvs, [23](#)
- nvmlGpuTopologyLevel\_t
  - nvmlDeviceStructs, [17](#)
- nvmlGpuVirtualizationMode\_t
  - nvmlGridEnums, [27](#)
- nvmlGridCommands
  - nvmlDeviceSetVirtualizationMode, [127](#)
- nvmlGridEnums
  - NVML\_GPU\_VIRTUALIZATION\_MODE\_HOST\_VGPU, [27](#)
  - NVML\_GPU\_VIRTUALIZATION\_MODE\_HOST\_VSGA, [27](#)
  - NVML\_GPU\_VIRTUALIZATION\_MODE\_NONE, [27](#)
  - NVML\_GPU\_VIRTUALIZATION\_MODE\_PASSTHROUGH, [27](#)
  - NVML\_GPU\_VIRTUALIZATION\_MODE\_VGPU, [27](#)

- nvmlGpuVirtualizationMode\_t, 27
- nvmlGridLicensableFeature\_t, 155
- nvmlGridQueries
  - nvmlDeviceGetVirtualizationMode, 126
- nvmlHwbcEntry\_t, 156
- nvmlInforomObject\_t
  - nvmlDeviceEnumvs, 23
- nvmlInit
  - nvmlInitializationAndCleanup, 45
- nvmlInitializationAndCleanup
  - nvmlInit, 45
  - nvmlInitWithFlags, 46
  - nvmlShutdown, 46
- nvmlInitWithFlags
  - nvmlInitializationAndCleanup, 46
- nvmlLedColor\_t
  - nvmlUnitStructs, 34
- nvmlLedState\_t, 157
- nvmlMemory\_t, 158
- nvmlMemoryErrorType\_t
  - nvmlDeviceEnumvs, 24
- nvmlMemoryLocation\_t
  - nvmlDeviceEnumvs, 24
- nvmlNvLinkCapability\_t
  - nvmlDeviceStructs, 17
- nvmlNvLinkErrorCounter\_t
  - nvmlDeviceStructs, 17
- nvmlNvLinkUtilizationControl\_t, 159
- nvmlNvLinkUtilizationCountPktTypes\_t
  - nvmlDeviceStructs, 17
- nvmlNvLinkUtilizationCountUnits\_t
  - nvmlDeviceStructs, 17
- nvmlPageRetirementCause\_t
  - nvmlDeviceEnumvs, 24
- nvmlPcieUtilCounter\_t
  - nvmlDeviceStructs, 17
- nvmlPciInfo\_t, 160
- nvmlPerfPolicyType\_t
  - nvmlDeviceStructs, 17
- nvmlProcessInfo\_t, 161
- nvmlProcessUtilizationSample\_t, 162
- nvmlPstates\_t
  - nvmlDeviceEnumvs, 24
- nvmlPSUInfo\_t, 163
- nvmlRestrictedAPI\_t
  - nvmlDeviceEnumvs, 25
- nvmlReturn\_t
  - nvmlDeviceEnumvs, 25
- nvmlSample\_t, 164
- nvmlSamplingType\_t
  - nvmlDeviceStructs, 18
- nvmlShutdown
  - nvmlInitializationAndCleanup, 46
- nvmlSystemGetCudaDriverVersion
  - nvmlSystemQueries, 49
- nvmlSystemGetDriverVersion
  - nvmlSystemQueries, 49
- nvmlSystemGetHicVersion
  - nvmlUnitQueries, 51
- nvmlSystemGetNVMLVersion
  - nvmlSystemQueries, 49
- nvmlSystemGetProcessName
  - nvmlSystemQueries, 50
- nvmlSystemGetTopologyGpuSet
  - nvmlDeviceQueries, 102
- nvmlSystemQueries
  - nvmlSystemGetCudaDriverVersion, 49
  - nvmlSystemGetDriverVersion, 49
  - nvmlSystemGetNVMLVersion, 49
  - nvmlSystemGetProcessName, 50
- nvmlTemperatureSensors\_t
  - nvmlDeviceEnumvs, 26
- nvmlTemperatureThresholds\_t
  - nvmlDeviceEnumvs, 26
- nvmlUnitCommands
  - nvmlUnitSetLedState, 104
- nvmlUnitFanInfo\_t, 165
- nvmlUnitFanSpeeds\_t, 166
- nvmlUnitGetCount
  - nvmlUnitQueries, 51
- nvmlUnitGetDevices
  - nvmlUnitQueries, 52
- nvmlUnitGetFanSpeedInfo
  - nvmlUnitQueries, 52
- nvmlUnitGetHandleByIndex
  - nvmlUnitQueries, 52
- nvmlUnitGetLedState
  - nvmlUnitQueries, 53
- nvmlUnitGetPsuInfo
  - nvmlUnitQueries, 53
- nvmlUnitGetTemperature
  - nvmlUnitQueries, 54
- nvmlUnitGetUnitInfo
  - nvmlUnitQueries, 54
- nvmlUnitInfo\_t, 167
- nvmlUnitQueries
  - nvmlSystemGetHicVersion, 51
  - nvmlUnitGetCount, 51
  - nvmlUnitGetDevices, 52
  - nvmlUnitGetFanSpeedInfo, 52
  - nvmlUnitGetHandleByIndex, 52
  - nvmlUnitGetLedState, 53
  - nvmlUnitGetPsuInfo, 53
  - nvmlUnitGetTemperature, 54
  - nvmlUnitGetUnitInfo, 54
- nvmlUnitSetLedState
  - nvmlUnitCommands, 104
- nvmlUnitStructs

- NVML\_FAN\_FAILED, 34
- NVML\_FAN\_NORMAL, 34
- NVML\_LED\_COLOR\_AMBER, 34
- NVML\_LED\_COLOR\_GREEN, 34
- nvmlFanState\_t, 34
- nvmlLedColor\_t, 34
- nvmlUtilization\_t, 168
- nvmlValue\_t, 169
- nvmlValueType\_t
  - nvmlDeviceStructs, 18
- nvmlVgpu
  - nvmlDeviceGetActiveVgpus, 129
  - nvmlDeviceGetCreatableVgpus, 129
  - nvmlDeviceGetGridLicensableFeatures, 130
  - nvmlDeviceGetProcessUtilization, 130
  - nvmlDeviceGetSupportedVgpus, 131
  - nvmlDeviceGetVgpuProcessUtilization, 132
  - nvmlDeviceGetVgpuUtilization, 133
  - nvmlVgpuInstanceGetEncoderCapacity, 134
  - nvmlVgpuInstanceGetEncoderSessions, 134
  - nvmlVgpuInstanceGetEncoderStats, 135
  - nvmlVgpuInstanceGetFbUsage, 135
  - nvmlVgpuInstanceGetFrameRateLimit, 135
  - nvmlVgpuInstanceGetLicenseStatus, 136
  - nvmlVgpuInstanceGetType, 136
  - nvmlVgpuInstanceGetUUID, 137
  - nvmlVgpuInstanceGetVmDriverVersion, 137
  - nvmlVgpuInstanceGetVmID, 138
  - nvmlVgpuInstanceSetEncoderCapacity, 138
  - nvmlVgpuTypeGetClass, 139
  - nvmlVgpuTypeGetDeviceID, 139
  - nvmlVgpuTypeGetFramebufferSize, 139
  - nvmlVgpuTypeGetFrameRateLimit, 140
  - nvmlVgpuTypeGetLicense, 140
  - nvmlVgpuTypeGetMaxInstances, 141
  - nvmlVgpuTypeGetName, 141
  - nvmlVgpuTypeGetNumDisplayHeads, 142
  - nvmlVgpuTypeGetResolution, 142
- nvmlVgpuConstants
  - NVML\_GRID\_LICENSE\_BUFFER\_SIZE, 41
- nvmlVgpuEnum
  - NVML\_VGPU\_VM\_ID\_DOMAIN\_ID, 42
  - NVML\_VGPU\_VM\_ID\_UUID, 42
  - nvmlVgpuVmIdType\_t, 42
- nvmlVgpuInstanceGetEncoderCapacity
  - nvmlVgpu, 134
- nvmlVgpuInstanceGetEncoderSessions
  - nvmlVgpu, 134
- nvmlVgpuInstanceGetEncoderStats
  - nvmlVgpu, 135
- nvmlVgpuInstanceGetFbUsage
  - nvmlVgpu, 135
- nvmlVgpuInstanceGetFrameRateLimit
  - nvmlVgpu, 135
- nvmlVgpuInstanceGetLicenseStatus
  - nvmlVgpu, 136
- nvmlVgpuInstanceGetType
  - nvmlVgpu, 136
- nvmlVgpuInstanceGetUUID
  - nvmlVgpu, 137
- nvmlVgpuInstanceGetVmDriverVersion
  - nvmlVgpu, 137
- nvmlVgpuInstanceGetVmID
  - nvmlVgpu, 138
- nvmlVgpuInstanceSetEncoderCapacity
  - nvmlVgpu, 138
- nvmlVgpuInstanceUtilizationSample\_t, 170
- nvmlVgpuProcessUtilizationSample\_t, 171
- nvmlVgpuTypeGetClass
  - nvmlVgpu, 139
- nvmlVgpuTypeGetDeviceID
  - nvmlVgpu, 139
- nvmlVgpuTypeGetFramebufferSize
  - nvmlVgpu, 139
- nvmlVgpuTypeGetFrameRateLimit
  - nvmlVgpu, 140
- nvmlVgpuTypeGetLicense
  - nvmlVgpu, 140
- nvmlVgpuTypeGetMaxInstances
  - nvmlVgpu, 141
- nvmlVgpuTypeGetName
  - nvmlVgpu, 141
- nvmlVgpuTypeGetNumDisplayHeads
  - nvmlVgpu, 142
- nvmlVgpuTypeGetResolution
  - nvmlVgpu, 142
- nvmlVgpuVmIdType\_t
  - nvmlVgpuEnum, 42
- nvmlViolationTime\_t, 172
- nvmlZPI
  - nvmlDeviceDiscoverGpus, 122
  - nvmlDeviceModifyDrainState, 122
  - nvmlDeviceQueryDrainState, 123
  - nvmlDeviceRemoveGpu, 123
- System Queries, 49
- Unit Commands, 104
- Unit Queries, 51
- Unit Structs, 34
- Vgpu Constants, 41
- Vgpu Enum, 42
- vGPU Management, 128
- Vgpu Structs, 43

### **Notice**

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

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

### **Trademarks**

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

### **Copyright**

© 2007-2016 NVIDIA Corporation. All rights reserved.