ROCmSMI

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Chapter 1

ROCm System Management Interface (ROCm SMI) Library

The ROCm System Management Interface Library, or ROCm SMI library, is part of the Radeon Open Compute ROCm software stack . It is a C library for Linux that provides a user space interface for applications to monitor and control GPU applications.

Building ROCm SMI

Additional Required software for building

In order to build the ROCm SMI library, the following components are required. Note that the software versions listed are what was used in development. Earlier versions are not guaranteed to work:

- CMake (v3.5.0)
- g++ (5.4.0)

In order to build the latest documentation, the following are required:

- DOxygen (1.8.11)
- latex (pdfTeX 3.14159265-2.6-1.40.16)

The source code for ROCm SMI is available on Github.

After the the ROCm SMI library git repository has been cloned to a local Linux machine, building the library is achieved by following the typical CMake build sequence. Specifically,

```
$ mk -p build

$ cd build

$ cmake <location of root of ROCm SMI library CMakeLists.txt>

$ make
```

The built library will appear in the `build` folder.

Building the Documentation

The documentation PDF file can be built with the following steps (continued from the steps above):

```
$ make doc

$ cd latex

$ make
```

The reference manual, `refman.pdf` will be in the `latex` directory upon a successful build.

Building the Tests

In order to verify the build and capability of ROCm SMI on your system and to see an example of how ROCm SMI can be used, you may build and run the tests that are available in the repo. To build the tests, follow these steps:

```
# Set environment variables used in CMakeLists.txt file

$ ROCM_DIR=<location of ROCm SMI library>

$ mkdir <location for test build>

$ cd <location for test build>

$ cmake -DROCM_DIR=<location of ROCM SMI library .so> <ROCm SMI source root>/tests/rocm
_smi_test
```

To run the test, execute the program `rsmitst` that is built from the steps above. Make sure ROCm SMI library is in your library search path when executing the test program.

Hello ROCm SMI

The only required ROCm-SMI call for any program that wants to use ROCm-SMI is the `rsmi_init()` call. This call initializes some internal data structures that will be used by subsequent ROCm-SMI calls.

When ROCm-SMI is no longer being used, `rsmi_shut_down()` should be called. This provides a way to do any releasing of resources that ROCm-SMI may have held. In many cases, this may have no effect, but may be necessary in future versions of the library.

A simple "Hello World" type program that displays the device ID of detected devices would look like this:

```
1 #include <stdint.h>
2 #include "rocm_smi/rocm_smi.h"
3 int main() {
4   rsmi_status_t ret;
5   uint32_t num_devices;
6   uint64_t dev_id;
7
8   // We will skip return code checks for this example, but it
9   // is recommended to always check this as some calls may not
10   // apply for some devices or ROCm releases
11
12   ret = rsmi_init(0);
13   ret = rsmi_num_monitor_devices(&num_devices);
14
15   for (int i=0; i < num_devices; ++i) {
16     ret = rsmi_dev_id_get(i &dev_id);
17     // dev_id holds the device ID of device i, upon a
18     // successful call
19   }
20   ret = rsmi_shut_down();
21   return 0;
22 }
```

Chapter 2

Data Structure Index

2.1 Data Structures

Here are the data structures with brief descriptions:

rsmi_freq_volt_region
: This structure holds 2 rsmi_od_vddc_point's, representing the diagonal corners of a rectangular region in freq-voltage space 7

rsmi_frequencies
: This structure holds information about clock frequencies 7

rsmi_od_vddc_point
: This structure represents a point on the frequency-voltage plane 8

rsmi_od_volt_freq_data
: This structure holds the frequency-voltage values for a device 9

rsmi_pcie_bandwidth
: This structure holds information about the possible PCIe bandwidths. Specifically, the possible transfer rates and their associated numbers of lanes are stored here 10

rsmi_power_profile_status
: This structure contains information about which power profiles are supported by the system for a given device, and which power profile is currently active 10

rsmi_range
: This structure represents a range (e.g., frequencies or voltages) 11

rsmi_version
: This structure holds version information 12

Chapter 3

File Index

3.1 File List

Here is a list of all documented files with brief descriptions:

rocm_smi.h 13

Chapter 4

Data Structure Documentation

4.1 rsmi_freq_volt_region Struct Reference

This structure holds 2 rsmi_od_vddc_point's, representing the diagonal corners of a rectangular region in freq-voltage space.

`#include <rocm_smi.h>`

Data Fields

- rsmi_od_vddc_point min_corner

  The "lower-left" corner of rectangle.
- rsmi_od_vddc_point max_corner

  The "upper-right" corner of rectangle.

4.1.1 Detailed Description

This structure holds 2 rsmi_od_vddc_point's, representing the diagonal corners of a rectangular region in freq-voltage space.

The documentation for this struct was generated from the following file:

- rocm_smi.h

4.2 rsmi_frequencies Struct Reference

This structure holds information about clock frequencies.

`#include <rocm_smi.h>`

Data Fields

- uint32_t num_supported
- uint32_t current
- uint64_t frequency [RSMI_MAX_NUM_FREQUENCIES]

4.2.1 Detailed Description

This structure holds information about clock frequencies.

4.2.2 Field Documentation

4.2.2.1 uint32_t rsmi_frequencies::num_supported

The number of supported frequencies

4.2.2.2 uint32_t rsmi_frequencies::current

The current frequency index

4.2.2.3 uint64_t rsmi_frequencies::frequency[RSMI_MAX_NUM_FREQUENCIES]

List of frequencies. Only the first num_supported frequencies are valid.

The documentation for this struct was generated from the following file:

- rocm_smi.h

4.3 rsmi_od_vddc_point Struct Reference

This structure represents a point on the frequency-voltage plane.

```
#include <rocm_smi.h>
```

Data Fields

- uint64_t frequency

  Frequency coordinate (in Hz)
- uint64_t voltage

  Voltage coordinate (in mV)

4.3.1 Detailed Description

This structure represents a point on the frequency-voltage plane.

The documentation for this struct was generated from the following file:

- rocm_smi.h

4.4 rsmi_od_volt_freq_data Struct Reference

This structure holds the frequency-voltage values for a device.

```
#include <rocm_smi.h>
```

Data Fields

- rsmi_range curr_sclk_range
  The current SCLK frequency range.
- rsmi_range curr_mclk_range
- rsmi_range sclk_freq_limits
  The range possible of SCLK values.
- rsmi_range mclk_freq_limits
  The range possible of MCLK values.
- rsmi_od_vddc_point curve [RSMI_NUM_VOLTAGE_CURVE_POINTS]
  The current voltage curve.
- uint32_t num_regions
  The number of voltage curve regions.

4.4.1 Detailed Description

This structure holds the frequency-voltage values for a device.

4.4.2 Field Documentation

4.4.2.1 rsmi_range rsmi_od_volt_freq_data::curr_mclk_range

The current MCLK frequency range; (upper bound only)

The documentation for this struct was generated from the following file:

- rocm_smi.h

4.5 rsmi_pcie_bandwidth Struct Reference

This structure holds information about the possible PCIe bandwidths. Specifically, the possible transfer rates and their associated numbers of lanes are stored here.

`#include <rocm_smi.h>`

Data Fields

- rsmi_frequencies transfer_rate
- uint32_t lanes [RSMI_MAX_NUM_FREQUENCIES]

4.5.1 Detailed Description

This structure holds information about the possible PCIe bandwidths. Specifically, the possible transfer rates and their associated numbers of lanes are stored here.

4.5.2 Field Documentation

4.5.2.1 rsmi_frequencies rsmi_pcie_bandwidth::transfer_rate

Transfer rates (T/s) that are possible

4.5.2.2 uint32_t rsmi_pcie_bandwidth::lanes[RSMI_MAX_NUM_FREQUENCIES]

List of lanes for corresponding transfer rate. Only the first num_supported bandwidths are valid.

The documentation for this struct was generated from the following file:

- rocm_smi.h

4.6 rsmi_power_profile_status Struct Reference

This structure contains information about which power profiles are supported by the system for a given device, and which power profile is currently active.

`#include <rocm_smi.h>`

Data Fields

- rsmi_bit_field available_profiles
- rsmi_power_profile_preset_masks current
- uint32_t num_profiles

4.6.1 Detailed Description

This structure contains information about which power profiles are supported by the system for a given device, and which power profile is currently active.

4.6.2 Field Documentation

4.6.2.1 rsmi_bit_field rsmi_power_profile_status::available_profiles

Which profiles are supported by this system

4.6.2.2 rsmi_power_profile_preset_masks rsmi_power_profile_status::current

Which power profile is currently active

4.6.2.3 uint32_t rsmi_power_profile_status::num_profiles

How many power profiles are available

The documentation for this struct was generated from the following file:

- rocm_smi.h

4.7 rsmi_range Struct Reference

This structure represents a range (e.g., frequencies or voltages).

```
#include <rocm_smi.h>
```

Data Fields

- uint64_t lower_bound
  Lower bound of range.
- uint64_t upper_bound
  Upper bound of range.

4.7.1 Detailed Description

This structure represents a range (e.g., frequencies or voltages).

The documentation for this struct was generated from the following file:

- rocm_smi.h

4.8 rsmi_version Struct Reference

This structure holds version information.

`#include <rocm_smi.h>`

Data Fields

- uint32_t major
  Major version.
- uint32_t minor
  Minor version.
- uint32_t patch
  Patch, build or stepping version.
- const char * build
  Build string.

4.8.1 Detailed Description

This structure holds version information.

The documentation for this struct was generated from the following file:

- rocm_smi.h

Chapter 5

File Documentation

5.1 rocm_smi.h File Reference

```
#include <stdint.h>
#include <stddef.h>
```

Data Structures

- struct rsmi_power_profile_status

  This structure contains information about which power profiles are supported by the system for a given device, and which power profile is currently active.
- struct rsmi_frequencies

  This structure holds information about clock frequencies.
- struct rsmi_pcie_bandwidth

  This structure holds information about the possible PCIe bandwidths. Specifically, the possible transfer rates and their associated numbers of lanes are stored here.
- struct rsmi_version

  This structure holds version information.
- struct rsmi_range

  This structure represents a range (e.g., frequencies or voltages).
- struct rsmi_od_vddc_point

  This structure represents a point on the frequency-voltage plane.
- struct rsmi_freq_volt_region

  This structure holds 2 rsmi_od_vddc_point's, representing the diagonal corners of a rectangular region in freq-voltage space.
- struct rsmi_od_volt_freq_data

  This structure holds the frequency-voltage values for a device.

Macros

- #define RSMI_MAX_NUM_FREQUENCIES 32

  Guaranteed maximum possible number of supported frequencies.
- #define RSMI_MAX_FAN_SPEED 255
- #define RSMI_NUM_VOLTAGE_CURVE_POINTS 3

  The number of points that make up a voltage-frequency curve definition.
- #define RSMI_MAX_NUM_POWER_PROFILES (sizeof(rsmi_bit_field) * 8)

  Number of possible power profiles that a system could support.

Typedefs

- typedef uint64_t rsmi_bit_field

  Bitfield used in various RSMI calls.

Enumerations

- enum rsmi_status_t {
  RSMI_STATUS_SUCCESS = 0x0, RSMI_STATUS_INVALID_ARGS, RSMI_STATUS_NOT_SUPPORTED, RSMI_STATUS_FILE_ERROR,
  RSMI_STATUS_PERMISSION, RSMI_STATUS_OUT_OF_RESOURCES, RSMI_STATUS_INTERNAL_EXCEPTION, RSMI_STATUS_INPUT_OUT_OF_BOUNDS,
  RSMI_STATUS_INIT_ERROR, **RSMI_INITIALIZATION_ERROR** = RSMI_STATUS_INIT_ERROR, RSMI_STATUS_NOT_YET_IMPLEMENTED, RSMI_STATUS_UNKNOWN_ERROR = 0xFFFFFFFF }

  Error codes retured by rocm_smi_lib functions.

- enum rsmi_dev_perf_level {
  RSMI_DEV_PERF_LEVEL_AUTO = 0, **RSMI_DEV_PERF_LEVEL_FIRST** = RSMI_DEV_PERF_LEVEL_AUTO, RSMI_DEV_PERF_LEVEL_LOW, RSMI_DEV_PERF_LEVEL_HIGH,
  RSMI_DEV_PERF_LEVEL_MANUAL, RSMI_DEV_PERF_LEVEL_STABLE_STD, RSMI_DEV_PERF_LEVEL_STABLE_PEAK, RSMI_DEV_PERF_LEVEL_STABLE_MIN_MCLK,
  RSMI_DEV_PERF_LEVEL_STABLE_MIN_SCLK, **RSMI_DEV_PERF_LEVEL_LAST** = RSMI_DEV_PERF_LEVEL_STABLE_MIN_SCLK, RSMI_DEV_PERF_LEVEL_UNKNOWN = 0x100 }

  PowerPlay performance levels.

- enum rsmi_clk_type { RSMI_CLK_TYPE_SYS = 0x0, **RSMI_CLK_TYPE_FIRST** = RSMI_CLK_TYPE_SYS, RSMI_CLK_TYPE_MEM, **RSMI_CLK_TYPE_LAST** = RSMI_CLK_TYPE_MEM }

  Available clock types.

- enum rsmi_temperature_metric {
  RSMI_TEMP_CURRENT = 0x0, **RSMI_TEMP_FIRST** = RSMI_TEMP_CURRENT, RSMI_TEMP_MAX, RSMI_TEMP_MIN,
  RSMI_TEMP_MAX_HYST, RSMI_TEMP_MIN_HYST, RSMI_TEMP_CRITICAL, RSMI_TEMP_CRITICAL_HYST,
  RSMI_TEMP_EMERGENCY, RSMI_TEMP_EMERGENCY_HYST, RSMI_TEMP_CRIT_MIN, RSMI_TEMP_CRIT_MIN_HYST,
  RSMI_TEMP_OFFSET, RSMI_TEMP_LOWEST, RSMI_TEMP_HIGHEST, **RSMI_TEMP_LAST** = RSMI_TEMP_HIGHEST }

  Temperature Metrics. This enum is used to identify various temperature metrics. Corresponding values will be in millidegress Celcius.

- enum rsmi_power_profile_preset_masks {
  RSMI_PWR_PROF_PRST_CUSTOM_MASK = 0x1, RSMI_PWR_PROF_PRST_VIDEO_MASK = 0x2, RSMI_PWR_PROF_PRST_POWER_SAVING_MASK = 0x4, RSMI_PWR_PROF_PRST_COMPUTE_MASK = 0x8,
  RSMI_PWR_PROF_PRST_VR_MASK = 0x10, **RSMI_PWR_PROF_PRST_3D_FULL_SCR_MASK** = 0x20, RSMI_PWR_PROF_PRST_BOOTUP_DEFAULT = 0x40, RSMI_PWR_PROF_PRST_LAST = RSMI_PWR_PROF_PRST_BOOTUP_DEFAULT,
  RSMI_PWR_PROF_PRST_INVALID = 0xFFFFFFFFFFFFFFFF }

  Pre-set Profile Selections. These bitmasks can be AND'd with the rsmi_power_profile_status::available_profiles returned from rsmi_dev_power_profile_presets_get() to determine which power profiles are supported by the system.

- enum rsmi_freq_ind { RSMI_FREQ_IND_MIN = 0, RSMI_FREQ_IND_MAX = 1, RSMI_FREQ_IND_INVALID = 0xFFFFFFFF }

  This values of this enum are used as frequency identifiers.

Functions

- rsmi_status_t rsmi_init (uint64_t init_flags)

  Initialize Rocm SMI.
- rsmi_status_t rsmi_shut_down (void)

  Shutdown Rocm SMI.
- rsmi_status_t rsmi_num_monitor_devices (uint32_t *num_devices)

  Get the number of devices that have monitor information.
- rsmi_status_t rsmi_dev_pci_bandwidth_get (uint32_t dv_ind, rsmi_pcie_bandwidth *bandwidth)

  Get the list of possible pci bandwidths that are available.
- rsmi_status_t rsmi_dev_busy_percent_get (uint32_t dv_ind, uint32_t *busy_percent)

  Get percentage of time device is busy doing any processing.
- rsmi_status_t rsmi_dev_pci_bandwidth_set (uint32_t dv_ind, uint64_t bw_bitmask)

  Control the set of allowed PCIe bandwidths that can be used.
- rsmi_status_t rsmi_dev_pci_id_get (uint32_t dv_ind, uint64_t *bdfid)

  Get the unique PCI device identifier associated for a device.
- rsmi_status_t rsmi_dev_id_get (uint32_t dv_ind, uint64_t *id)

  Get the device id associated with the device with provided device index.
- rsmi_status_t rsmi_dev_perf_level_get (uint32_t dv_ind, rsmi_dev_perf_level *perf)

  Get the performance level of the device with provided device index.
- rsmi_status_t rsmi_dev_perf_level_set (int32_t dv_ind, rsmi_dev_perf_level perf_lvl)

  Set the PowerPlay performance level associated with the device with provided device index with the provided value.
- rsmi_status_t rsmi_dev_overdrive_level_get (uint32_t dv_ind, uint32_t *od)

  Get the overdrive percent associated with the device with provided device index.
- rsmi_status_t rsmi_dev_overdrive_level_set (int32_t dv_ind, uint32_t od)

  Set the overdrive percent associated with the device with provided device index with the provided value. See details for WARNING.
- rsmi_status_t rsmi_dev_gpu_clk_freq_get (uint32_t dv_ind, rsmi_clk_type clk_type, rsmi_frequencies *f)

  Get the list of possible system clock speeds of device for a specified clock type.
- rsmi_status_t rsmi_dev_gpu_clk_freq_set (uint32_t dv_ind, rsmi_clk_type clk_type, uint64_t freq_bitmask)

  Control the set of allowed frequencies that can be used for the specified clock.
- rsmi_status_t rsmi_dev_name_get (uint32_t dv_ind, char *name, size_t len)

  Get the name of a gpu device.
- rsmi_status_t rsmi_dev_temp_metric_get (uint32_t dv_ind, uint32_t sensor_ind, rsmi_temperature_metric metric, int64_t *temperature)

  Get the temperature metric value for the specifed metric, from the specified temperature sensor on the specified device.
- rsmi_status_t rsmi_dev_fan_reset (uint32_t dv_ind, uint32_t sensor_ind)

  Reset the fan to automatic driver control.
- rsmi_status_t rsmi_dev_fan_rpms_get (uint32_t dv_ind, uint32_t sensor_ind, int64_t *speed)

  Get the fan speed in RPMs of the device with the specified device index and 0-based sensor index.
- rsmi_status_t rsmi_dev_fan_speed_get (uint32_t dv_ind, uint32_t sensor_ind, int64_t *speed)

  Get the fan speed for the specfied device in RPMs.
- rsmi_status_t rsmi_dev_fan_speed_max_get (uint32_t dv_ind, uint32_t sensor_ind, uint64_t *max_speed)

  Get the max. fan speed of the device with provided device index.
- rsmi_status_t rsmi_dev_fan_speed_set (uint32_t dv_ind, uint32_t sensor_ind, uint64_t speed)

  Set the fan speed for the specfied device with the provided speed, in RPMs.
- rsmi_status_t rsmi_dev_od_volt_info_get (uint32_t dv_ind, rsmi_od_volt_freq_data *odv)

  This function retrieves the voltage/frequency curve information.
- rsmi_status_t rsmi_dev_od_volt_curve_regions_get (uint32_t dv_ind, uint32_t *num_regions, rsmi_freq_↩ volt_region *buffer)

  This function will retrieve the current valid regions in the frequency/voltage space.

- rsmi_status_t rsmi_dev_power_ave_get (uint32_t dv_ind, uint32_t sensor_ind, uint64_t *power)

  Get the average power consumption of the device with provided device index.
- rsmi_status_t rsmi_dev_power_cap_get (uint32_t dv_ind, uint32_t sensor_ind, uint64_t *cap)

  Get the cap on power which, when reached, causes the system to take action to reduce power.
- rsmi_status_t rsmi_dev_power_cap_range_get (uint32_t dv_ind, uint32_t sensor_ind, uint64_t *max, uint64_t *min)

  Get the range of valid values for the power cap.
- rsmi_status_t rsmi_dev_power_cap_set (uint32_t dv_ind, uint32_t sensor_ind, uint64_t cap)

  Set the power cap value.
- rsmi_status_t rsmi_dev_power_profile_presets_get (uint32_t dv_ind, uint32_t sensor_ind, rsmi_power_profile_status *status)

  Get the list of available preset power profiles and an indication of which profile is currently active.
- rsmi_status_t rsmi_dev_power_profile_set (uint32_t dv_ind, uint32_t sensor_ind, rsmi_power_profile_preset_masks profile)

  Set the power profile.
- rsmi_status_t rsmi_status_string (rsmi_status_t status, const char **status_string)

  Get a description of a provided RSMI error status.
- rsmi_status_t rsmi_version_get (rsmi_version *version)

  Get the build version information for the currently running build of RSMI.

5.1.1 Detailed Description

Main header file for the ROCm SMI library. All required function, structure, enum, etc. definitions should be defined in this file.

The rocm_smi library api is new, and therefore subject to change either at the ABI or API level. Once committed, every effort will be made to not break backward compatibility, but it may not be achieveable in some cases. Instead of marking every function prototype as "unstable", we are instead saying the API is unstable (i.e., changes are possible) while the major version remains 0. This means that if the API/ABI changes, we will not increment the major version to 1. Once the ABI stabilizes, we will increment the major version to 1, and thereafter increment it on all ABI breaks.

5.1.2 Macro Definition Documentation

5.1.2.1 #define RSMI_MAX_FAN_SPEED 255

Maximum possible value for fan speed. Should be used as the denominator when determining fan speed percentage.

5.1.3 Enumeration Type Documentation

5.1.3.1 enum rsmi_status_t

Error codes retured by rocm_smi_lib functions.

Enumerator

RSMI_STATUS_SUCCESS Operation was successful.

RSMI_STATUS_INVALID_ARGS Passed in arguments are not valid.

RSMI_STATUS_NOT_SUPPORTED The requested information or action is not available for the given input

RSMI_STATUS_FILE_ERROR Problem accessing a file. This may because the operation is not supported by the Linux kernel version running on the executing machine

RSMI_STATUS_PERMISSION Permission denied/EACCESS file error

RSMI_STATUS_OUT_OF_RESOURCES Unable to acquire memory or other resource

RSMI_STATUS_INTERNAL_EXCEPTION An internal exception was caught.

RSMI_STATUS_INPUT_OUT_OF_BOUNDS The provided input is out of allowable or safe range

RSMI_STATUS_INIT_ERROR An error occurred when rsmi initializing internal data structures

RSMI_STATUS_NOT_YET_IMPLEMENTED The requested function has not yet been implemented in the current system for the current devices

RSMI_STATUS_UNKNOWN_ERROR An unknown error occurred.

5.1.3.2 enum rsmi_dev_perf_level

PowerPlay performance levels.

Enumerator

RSMI_DEV_PERF_LEVEL_AUTO Performance level is "auto".

RSMI_DEV_PERF_LEVEL_LOW Keep PowerPlay levels "low", regardless of workload

RSMI_DEV_PERF_LEVEL_HIGH Keep PowerPlay levels "high", regardless of workload

RSMI_DEV_PERF_LEVEL_MANUAL Only use values defined by manually setting the RSMI_CLK_TYP↩ E_SYS speed

RSMI_DEV_PERF_LEVEL_STABLE_STD Stable power state with profiling clocks

RSMI_DEV_PERF_LEVEL_STABLE_PEAK Stable power state with peak clocks.

RSMI_DEV_PERF_LEVEL_STABLE_MIN_MCLK Stable power state with minimum memory clock

RSMI_DEV_PERF_LEVEL_STABLE_MIN_SCLK Stable power state with minimum system clock

RSMI_DEV_PERF_LEVEL_UNKNOWN Unknown performance level.

5.1.3.3 enum rsmi_clk_type

Available clock types.

Enumerator

RSMI_CLK_TYPE_SYS System clock.

RSMI_CLK_TYPE_MEM Memory clock.

5.1.3.4 enum rsmi_temperature_metric

Temperature Metrics. This enum is used to identify various temperature metrics. Corresponding values will be in millidegress Celcius.

Enumerator

RSMI_TEMP_CURRENT Temperature current value.

RSMI_TEMP_MAX Temperature max value.

RSMI_TEMP_MIN Temperature min value.

RSMI_TEMP_MAX_HYST Temperature hysteresis value for max limit.

RSMI_TEMP_MIN_HYST Temperature hysteresis value for min limit.

RSMI_TEMP_CRITICAL Temperature critical max value, typically greater than corresponding temp_max values.

RSMI_TEMP_CRITICAL_HYST Temperature hysteresis value for critical limit.

RSMI_TEMP_EMERGENCY Temperature emergency max value, for chips supporting more than two upper temperature limits. Must be equal or greater than corresponding temp_crit values.

RSMI_TEMP_EMERGENCY_HYST Temperature hysteresis value for emergency limit.

RSMI_TEMP_CRIT_MIN Temperature critical min value, typically lower than corresponding temperature minimum values.

RSMI_TEMP_CRIT_MIN_HYST Temperature hysteresis value for critical minimum limit.

RSMI_TEMP_OFFSET Temperature offset which is added to the temperature reading by the chip.

RSMI_TEMP_LOWEST Historical minimum temperature.

RSMI_TEMP_HIGHEST Historical maximum temperature.

5.1.3.5 enum rsmi_power_profile_preset_masks

Pre-set Profile Selections. These bitmasks can be AND'd with the rsmi_power_profile_status::available_profiles returned from rsmi_dev_power_profile_presets_get() to determine which power profiles are supported by the system.

Enumerator

RSMI_PWR_PROF_PRST_CUSTOM_MASK Custom Power Profile.

RSMI_PWR_PROF_PRST_VIDEO_MASK Video Power Profile.

RSMI_PWR_PROF_PRST_POWER_SAVING_MASK Power Saving Profile.

RSMI_PWR_PROF_PRST_COMPUTE_MASK Compute Saving Profile.

RSMI_PWR_PROF_PRST_VR_MASK VR Power Profile. 3D Full Screen Power Profile

RSMI_PWR_PROF_PRST_BOOTUP_DEFAULT Default Boot Up Profile.

RSMI_PWR_PROF_PRST_LAST Invalid power profile.

5.1.3.6 enum rsmi_freq_ind

This values of this enum are used as frequency identifiers.

Enumerator

RSMI_FREQ_IND_MIN Index used for the minimum frequency value.

RSMI_FREQ_IND_MAX Index used for the maximum frequency value.

RSMI_FREQ_IND_INVALID An invalid frequency index.

5.1.4 Function Documentation

5.1.4.1 rsmi_status_t rsmi_init (uint64_t *init_flags*)

Initialize Rocm SMI.

When called, this initializes internal data structures, including those corresponding to sources of information that SMI provides.

Parameters

in	*init_flags*	Bit flags that tell SMI how to initialze. Not currently used.

Return values

RSMI_STATUS_SUCCESS	is returned upon successful call.

5.1.4.2 rsmi_status_t rsmi_shut_down (void)

Shutdown Rocm SMI.

Do any necessary clean up.

5.1.4.3 rsmi_status_t rsmi_num_monitor_devices (uint32_t * *num_devices*)

Get the number of devices that have monitor information.

The number of devices which have monitors is returned. Monitors are referenced by the index which can be between 0 and `num_devices` - 1.

Parameters

in,out	*num_devices*	Caller provided pointer to uint32_t. Upon successful call, the value num_devices will contain the number of monitor devices.

Return values

RSMI_STATUS_SUCCESS	is returned upon successful call.

5.1.4.4 rsmi_status_t rsmi_dev_pci_bandwidth_get (uint32_t *dv_ind,* rsmi_pcie_bandwidth * *bandwidth*)

Get the list of possible pci bandwidths that are available.

Given a device index `dv_ind` and a pointer to a to an rsmi_pcie_bandwidth structure `bandwidth`, this function will fill in `bandwidth` with the possible T/s values and associated number of lanes, and indication of the current selection.

Parameters

in	*dv_ind*	a device index
in,out	*bandwidth*	a pointer to a caller provided rsmi_pcie_bandwidth structure to which the frequency information will be written

Return values

RSMI_STATUS_SUCCESS	is returned upon successful call.

5.1.4.5 rsmi_status_t rsmi_dev_busy_percent_get (uint32_t *dv_ind*, uint32_t * *busy_percent*)

Get percentage of time device is busy doing any processing.

Given a device index dv_ind, this function returns the percentage of time that the specified device is busy. The device is considered busy if any one or more of its sub-blocks are working, and idle if none of the sub-blocks are working.

Parameters

in	*dv_ind*	a device index
in,out	*busy_percent*	a pointer to the uint32_t to which the busy percent will be written

Return values

RSMI_STATUS_SUCCESS	is returned upon successful call

5.1.4.6 rsmi_status_t rsmi_dev_pci_bandwidth_set (uint32_t *dv_ind*, uint64_t *bw_bitmask*)

Control the set of allowed PCIe bandwidths that can be used.

Given a device index dv_ind and a 64 bit bitmask bw_bitmask, this function will limit the set of allowable bandwidths. If a bit in bw_bitmask has a value of 1, then the frequency (as ordered in an rsmi_frequencies returned by rsmi_dev_get_gpu_clk_freq()) corresponding to that bit index will be allowed.

This function will change the performance level to RSMI_DEV_PERF_LEVEL_MANUAL in order to modify the set of allowable band_widths. Caller will need to set to RSMI_DEV_PERF_LEVEL_AUTO in order to get back to default state.

All bits with indices greater than or equal to rsmi_pcie_bandwidth.transfer_rate.num_supported will be ignored.

Parameters

in	*dv_ind*	a device index
in	*bw_bitmask*	A bitmask indicating the indices of the bandwidths that are to be enabled (1) and disabled (0). Only the lowest rsmi_pcie_bandwidth.transfer_rate.num_supported bits of this mask are relevant.

5.1.4.7 rsmi_status_t rsmi_dev_pci_id_get (uint32_t *dv_ind*, uint64_t * *bdfid*)

Get the unique PCI device identifier associated for a device.

Give a device index `dv_ind` and a pointer to a uint64_t `bdfid`, this function will write the Bus/Device/Function PCI identifier (BDFID) associated with device `dv_ind` to the value pointed to by `bdfid`.

Parameters

`in`	*dv_ind*	a device index
`in,out`	*bdfid*	a pointer to uint64_t to which the device bdfid value will be written

Return values

RSMI_STATUS_SUCCESS	is returned upon successful call.

5.1.4.8 rsmi_status_t rsmi_dev_id_get (uint32_t *dv_ind*, uint64_t * *id*)

Get the device id associated with the device with provided device index.

Given a device index `dv_ind` and a pointer to a uint32_t `id`, this function will write the device id value to the uint64_t pointed to by `id`. This ID is an identification of the type of device, so calling this function for different devices will give the same value if they are kind of device. Consequently, this function should not be used to distinguish one device from another. rsmi_dev_pci_id_get() should be used to get a unique identifier.

Parameters

`in`	*dv_ind*	a device index
`in,out`	*id*	a pointer to uint64_t to which the device id will be written

Return values

RSMI_STATUS_SUCCESS	is returned upon successful call.

5.1.4.9 rsmi_status_t rsmi_dev_perf_level_get (uint32_t *dv_ind*, rsmi_dev_perf_level * *perf*)

Get the performance level of the device with provided device index.

Given a device index `dv_ind` and a pointer to a uint32_t `perf`, this function will write the rsmi_dev_perf_level to the uint32_t pointed to by `perf`

Parameters

`in`	*dv_ind*	a device index
`in,out`	*perf*	a pointer to rsmi_dev_perf_level to which the performance level will be written

Return values

RSMI_STATUS_SUCCESS	is returned upon successful call.

5.1.4.10 rsmi_status_t rsmi_dev_perf_level_set (int32_t *dv_ind*, rsmi_dev_perf_level *perf_lvl*)

Set the PowerPlay performance level associated with the device with provided device index with the provided value.

Given a device index `dv_ind` and an rsmi_dev_perf_lvl `perf_level`, this function will set the PowerPlay performance level for the device to the value `perf_lvl`.

Parameters

`in`	*dv_ind*	a device index
`in`	*perf_lvl*	the value to which the performance level should be set

Return values

RSMI_STATUS_SUCCESS	is returned upon successful call.

5.1.4.11 rsmi_status_t rsmi_dev_overdrive_level_get (uint32_t *dv_ind*, uint32_t * *od*)

Get the overdrive percent associated with the device with provided device index.

Given a device index `dv_ind` and a pointer to a uint32_t `od`, this function will write the overdrive percentage to the uint32_t pointed to by `od`

Parameters

`in`	*dv_ind*	a device index
`in,out`	*od*	a pointer to uint32_t to which the overdrive percentage will be written

Return values

RSMI_STATUS_SUCCESS	is returned upon successful call.

5.1.4.12 rsmi_status_t rsmi_dev_overdrive_level_set (int32_t *dv_ind*, uint32_t *od*)

Set the overdrive percent associated with the device with provided device index with the provided value. See details for WARNING.

Given a device index `dv_ind` and an overdrive level `od`, this function will set the overdrive level for the device to the value `od`. The overdrive level is an integer value between 0 and 20, inclusive, which represents the overdrive percentage; e.g., a value of 5 specifies an overclocking of 5%.

The overdrive level is specific to the gpu system clock.

The overdrive level is the percentage above the maximum Performance Level to which overclocking will be limited. The overclocking percentage does not apply to clock speeds other than the maximum. This percentage is limited to 20%.

******WARNING****** Operating your AMD GPU outside of official AMD specifications or outside of factory settings, including but not limited to the conducting of overclocking (including use of this overclocking software, even if such software has been directly or indirectly provided by AMD or otherwise affiliated in any way with AMD), may cause damage to your AMD GPU, system components and/or result in system failure, as well as cause other problems. DAMAGES CAUSED BY USE OF YOUR AMD GPU OUTSIDE OF OFFICIAL AMD SPECIFICATIONS OR OUTSIDE OF FACTORY SETTINGS ARE NOT COVERED UNDER ANY AMD PRODUCT WARRANTY A↩ ND MAY NOT BE COVERED BY YOUR BOARD OR SYSTEM MANUFACTURER'S WARRANTY. Please use this utility with caution.

Parameters

in	*dv_ind*	a device index
in	*od*	the value to which the overdrive level should be set

Return values

RSMI_STATUS_SUCCESS	is returned upon successful call.

5.1.4.13 rsmi_status_t rsmi_dev_gpu_clk_freq_get (uint32_t *dv_ind*, rsmi_clk_type *clk_type*, rsmi_frequencies * *f*)

Get the list of possible system clock speeds of device for a specified clock type.

Given a device index `dv_ind`, a clock type `clk_type`, and a pointer to a to an rsmi_frequencies structure `f`, this function will fill in `f` with the possible clock speeds, and indication of the current clock speed selection.

Parameters

in	*dv_ind*	a device index
in	*clk_type*	the type of clock for which the frequency is desired
in,out	*f*	a pointer to a caller provided rsmi_frequencies structure to which the frequency information will be written

Return values

RSMI_STATUS_SUCCESS	is returned upon successful call.

5.1.4.14 rsmi_status_t rsmi_dev_gpu_clk_freq_set (uint32_t *dv_ind*, rsmi_clk_type *clk_type*, uint64_t *freq_bitmask*)

Control the set of allowed frequencies that can be used for the specified clock.

Given a device index `dv_ind`, a clock type `clk_type`, and a 64 bit bitmask `freq_bitmask`, this function will limit the set of allowable frequencies. If a bit in `freq_bitmask` has a value of 1, then the frequency (as ordered in an rsmi_frequencies returned by rsmi_dev_get_gpu_clk_freq()) corresponding to that bit index will be allowed.

This function will change the performance level to RSMI_DEV_PERF_LEVEL_MANUAL in order to modify the set of allowable frequencies. Caller will need to set to RSMI_DEV_PERF_LEVEL_AUTO in order to get back to default state.

All bits with indices greater than or equal to rsmi_frequencies::num_supported will be ignored.

Parameters

in	*dv_ind*	a device index
in	*clk_type*	the type of clock for which the set of frequencies will be modified
in	*freq_bitmask*	A bitmask indicating the indices of the frequencies that are to be enabled (1) and disabled (0). Only the lowest rsmi_frequencies.num_supported bits of this mask are relevant.

5.1.4.15 rsmi_status_t rsmi_dev_name_get (uint32_t *dv_ind*, char * *name*, size_t *len*)

Get the name of a gpu device.

Given a device index `dv_ind`, a pointer to a caller provided char buffer `name`, and a length of this buffer `len`, this function will write the name of the device (up to `len` characters) buffer `name`.

Parameters

in	*dv_ind*	a device index
in,out	*name*	a pointer to a caller provided char buffer to which the name will be written
in	*len*	the length of the caller provided buffer `name`.

Return values

RSMI_STATUS_SUCCESS	is returned upon successful call.

5.1.4.16 rsmi_status_t rsmi_dev_temp_metric_get (uint32_t *dv_ind*, uint32_t *sensor_ind*, rsmi_temperature_metric *metric*, int64_t * *temperature*)

Get the temperature metric value for the specifed metric, from the specified temperature sensor on the specified device.

Given a device index `dv_ind`, a 0-based sensor index

Parameters

in	*dv_ind*	a device index
in	*sensor_ind*	a 0-based sensor index. Normally, this will be 0. If a device has more than one sensor, it could be greater than 0.
in	*metric*	enum indicated which temperature value should be retrieved
in,out	*temperature*	a pointer to int64_t to which the temperature will be written, in millidegrees Celcius.

Return values

RSMI_STATUS_SUCCESS	is returned upon successful call.

5.1.4.17 rsmi_status_t rsmi_dev_fan_reset (uint32_t *dv_ind*, uint32_t *sensor_ind*)

Reset the fan to automatic driver control.

This function returns control of the fan to the system

Parameters

in	*dv_ind*	a device index
in	*sensor_ind*	a 0-based sensor index. Normally, this will be 0. If a device has more than one sensor, it could be greater than 0.

Return values

RSMI_STATUS_SUCCESS	is returned upon successful call.

5.1.4.18 rsmi_status_t rsmi_dev_fan_rpms_get (uint32_t *dv_ind*, uint32_t *sensor_ind*, int64_t * *speed*)

Get the fan speed in RPMs of the device with the specified device index and 0-based sensor index.

Given a device index `dv_ind` and a pointer to a uint32_t `speed`, this function will write the current fan speed in RPMs to the uint32_t pointed to by `speed`

Parameters

in	*dv_ind*	a device index
in	*sensor_ind*	a 0-based sensor index. Normally, this will be 0. If a device has more than one sensor, it could be greater than 0.
in,out	*speed*	a pointer to uint32_t to which the speed will be written

Return values

RSMI_STATUS_SUCCESS	is returned upon successful call.

5.1.4.19 rsmi_status_t rsmi_dev_fan_speed_get (uint32_t *dv_ind*, uint32_t *sensor_ind*, int64_t * *speed*)

Get the fan speed for the specfied device in RPMs.

Given a device index `dv_ind` this function will get the fan speed.

Parameters

in	*dv_ind*	a device index

Given a device index dv_ind and a pointer to a uint32_t speed, this function will write the current fan speed (a value between 0 and 255) to the uint32_t pointed to by speed

Parameters

in	*dv_ind*	a device index
in	*sensor_ind*	a 0-based sensor index. Normally, this will be 0. If a device has more than one sensor, it could be greater than 0.
in,out	*speed*	a pointer to uint32_t to which the speed will be written

Return values

RSMI_STATUS_SUCCESS	is returned upon successful call.

5.1.4.20 rsmi_status_t rsmi_dev_fan_speed_max_get (uint32_t *dv_ind*, uint32_t *sensor_ind*, uint64_t * *max_speed*)

Get the max. fan speed of the device with provided device index.

Given a device index dv_ind and a pointer to a uint32_t max_speed, this function will write the maximum fan speed possible to the uint32_t pointed to by max_speed

Parameters

in	*dv_ind*	a device index
in	*sensor_ind*	a 0-based sensor index. Normally, this will be 0. If a device has more than one sensor, it could be greater than 0.
in,out	*max_speed*	a pointer to uint32_t to which the maximum speed will be written

Return values

RSMI_STATUS_SUCCESS	is returned upon successful call.

5.1.4.21 rsmi_status_t rsmi_dev_fan_speed_set (uint32_t *dv_ind*, uint32_t *sensor_ind*, uint64_t *speed*)

Set the fan speed for the specfied device with the provided speed, in RPMs.

Given a device index dv_ind and a integer value indicating speed speed, this function will attempt to set the fan speed to speed. An error will be returned if the specified speed is outside the allowable range for the device. The maximum value is 255 and the minimum is 0.

Parameters

in	*dv_ind*	a device index
in	*sensor_ind*	a 0-based sensor index. Normally, this will be 0. If a device has more than one sensor, it could be greater than 0.
in	*speed*	the speed to which the function will attempt to set the fan

Return values

RSMI_STATUS_SUCCESS	is returned upon successful call.

5.1.4.22 rsmi_status_t rsmi_dev_od_volt_info_get (uint32_t *dv_ind*, rsmi_od_volt_freq_data * *odv*)

This function retrieves the voltage/frequency curve information.

Given a device index `dv_ind` and a pointer to a rsmi_od_volt_freq_data structure `odv`, this function will populate `odv`. See rsmi_od_volt_freq_data for more details.

Parameters

`in`	*dv_ind*	a device index
`in`	*odv*	a pointer to an rsmi_od_volt_freq_data structure

Return values

RSMI_STATUS_SUCCESS	is returned upon successful call.

5.1.4.23 rsmi_status_t rsmi_dev_od_volt_curve_regions_get (uint32_t *dv_ind*, uint32_t * *num_regions*, rsmi_freq_volt_region * *buffer*)

This function will retrieve the current valid regions in the frequency/voltage space.

Given a device index `dv_ind`, a pointer to an unsigned integer `num_regions` and a buffer of rsmi_freq_volt_region structures, `buffer`, this function will populate `buffer` with the current frequency-volt space regions. The caller should assign `buffer` to memory that can be written to by this function. The caller should also indicate the number of rsmi_freq_volt_region structures that can safely be written to `buffer` in `num_regions`.

The number of regions to expect this function provide (`num_regions`) can be obtained by calling rsmi_dev_od_volt_info_get().

Parameters

`in`	*dv_ind*	a device index
`in,out`	*num_regions*	As input, this is the number of rsmi_freq_volt_region structures that can be written to `buffer`. As output, this is the number of rsmi_freq_volt_region structures that were actually written.
`in,out`	*buffer*	a caller provided buffer to which rsmi_freq_volt_region structures will be written

Return values

RSMI_STATUS_SUCCESS	is returned upon successful call.

5.1.4.24 rsmi_status_t rsmi_dev_power_ave_get (uint32_t *dv_ind*, uint32_t *sensor_ind*, uint64_t * *power*)

Get the average power consumption of the device with provided device index.

Given a device index `dv_ind` and a pointer to a uint64_t `power`, this function will write the current average power consumption to the uint64_t in microwatts pointed to by `power`. This function requires root privilege.

Parameters

`in`	*dv_ind*	a device index
`in`	*sensor_ind*	a 0-based sensor index. Normally, this will be 0. If a device has more than one sensor, it could be greater than 0.
`in,out`	*power*	a pointer to uint64_t to which the average power consumption will be written

Return values

RSMI_STATUS_SUCCESS	is returned upon successful call.

5.1.4.25 rsmi_status_t rsmi_dev_power_cap_get (uint32_t *dv_ind*, uint32_t *sensor_ind*, uint64_t * *cap*)

Get the cap on power which, when reached, causes the system to take action to reduce power.

When power use rises above the value `power`, the system will take action to reduce power use. The power level returned through `power` will be in microWatts.

Parameters

`in`	*dv_ind*	a device index
`in`	*sensor_ind*	a 0-based sensor index. Normally, this will be 0. If a device has more than one sensor, it could be greater than 0.
`in,out`	*cap*	a pointer to a uint64_t that indicates the power cap, in microwatts

Return values

RSMI_STATUS_SUCCESS	is returned upon successful call.

5.1.4.26 rsmi_status_t rsmi_dev_power_cap_range_get (uint32_t *dv_ind*, uint32_t *sensor_ind*, uint64_t * *max*, uint64_t * *min*)

Get the range of valid values for the power cap.

This function will return the maximum possible valid power cap `max` and the minimum possible valid power cap `min`

Parameters

`in`	*dv_ind*	a device index
`in`	*sensor_ind*	a 0-based sensor index. Normally, this will be 0. If a device has more than one sensor, it could be greater than 0.
`in,out`	*max*	a pointer to a uint64_t that indicates the maximum possible power cap, in microwatts
`in,out`	*min*	a pointer to a uint64_t that indicates the minimum possible power cap, in microwatts

Return values

RSMI_STATUS_SUCCESS	is returned upon successful call.

5.1.4.27 rsmi_status_t rsmi_dev_power_cap_set (uint32_t *dv_ind*, uint32_t *sensor_ind*, uint64_t *cap*)

Set the power cap value.

This function will set the power cap to the provided value `cap`. `cap` must be between the minimum and maximum power cap values set by the system, which can be obtained from rsmi_dev_power_cap_range_get.

Parameters

`in`	*dv_ind*	a device index
`in`	*sensor_ind*	a 0-based sensor index. Normally, this will be 0. If a device has more than one sensor, it could be greater than 0.
`in,out`	*cap*	a uint64_t that indicates the desired power cap, in microwatts

Return values

RSMI_STATUS_SUCCESS	is returned upon successful call.

5.1.4.28 rsmi_status_t rsmi_dev_power_profile_presets_get (uint32_t *dv_ind*, uint32_t *sensor_ind*, rsmi_power_profile_status * *status*)

Get the list of available preset power profiles and an indication of which profile is currently active.

Given a device index `dv_ind` and a pointer to a rsmi_power_profile_status `status`, this function will set the bits of the rsmi_power_profile_status.available_profiles bit field of `status` to 1 if the profile corresponding to the respective rsmi_power_profile_preset_masks profiles are enabled. For example, if both the VIDEO and VR power profiles are available selections, then RSMI_PWR_PROF_PRST_VIDEO_MASK AND'ed with rsmi_power_profile_status.available_profiles will be non-zero as will RSMI_PWR_PROF_PRST_VR_MASK AND'ed with rsmi_power_profile_status.available_profiles. Additionally, rsmi_power_profile_status.current will be set to the rsmi_power_profile_preset_masks of the profile that is currently active.

Parameters

`in`	*dv_ind*	a device index
`in`	*sensor_ind*	a 0-based sensor index. Normally, this will be 0. If a device has more than one sensor, it could be greater than 0.
`in,out`	*status*	a pointer to rsmi_power_profile_status that will be populated by a call to this function

Return values

RSMI_STATUS_SUCCESS	is returned upon successful call.

5.1.4.29 rsmi_status_t rsmi_dev_power_profile_set (uint32_t *dv_ind*, uint32_t *sensor_ind*, rsmi_power_profile_preset_masks *profile*)

Set the power profile.

Given a device index `dv_ind`, a sensor index sensor_ind, and a `profile`, this function will attempt to set the current profile to the provided profile. The provided profile must be one of the currently supported profiles, as indicated by a call to rsmi_dev_power_profile_presets_get()

Parameters

`in`	*dv_ind*	a device index
`in`	*sensor_ind*	a 0-based sensor index. Normally, this will be 0. If a device has more than one sensor, it could be greater than 0.
`in`	*profile*	a rsmi_power_profile_preset_masks that hold the mask of the desired new power profile

Return values

RSMI_STATUS_SUCCESS	is returned upon successful call.

5.1.4.30 rsmi_status_t rsmi_status_string (rsmi_status_t *status*, const char ** *status_string*)

Get a description of a provided RSMI error status.

Set the provided pointer to a const char *, `status_string`, to a string containing a description of the provided error code `status`.

Parameters

`in`	*status*	The error status for which a description is desired
`in,out`	*status_string*	A pointer to a const char * which will be made to point to a description of the provided error code

Return values

RSMI_STATUS_SUCCESS	is returned upon successful call

5.1.4.31 rsmi_status_t rsmi_version_get (rsmi_version * *version*)

Get the build version information for the currently running build of RSMI.

Get the major, minor, patch and build string for RSMI build currently in use through `version`

Parameters

`in,out`	*version*	A pointer to an rsmi_version structure that will be updated with the version information upon return.

Return values

RSMI_STATUS_SUCCESS	is returned upon successful call

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