Asynchronous Task and Memory Interface (ATMI)

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2.1 Class List

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Module Documentation

3.1 Kernel Handles

Classes

- struct atmi_kernel_s

  Opaque handle representing an ATMI Kernel.

Typedefs

- typedef struct atmi_kernel_s atmi_kernel_t

  Opaque handle representing an ATMI Kernel.
- typedef void(∗ atmi_generic_fp)(void)

  A generic function pointer representing CPU tasks.

Functions

- atmi_status_t atmi_kernel_create_empty (atmi_kernel_t ∗kernel, const int num_args, const size_t ∗arg_sizes)

  Create an empty kernel opaque structure.
- atmi_status_t atmi_kernel_add_gpu_impl (atmi_kernel_t atmi_kernel, const char ∗impl, const unsigned int ID)

  Add a GPU kernel implementation.
- atmi_status_t atmi_kernel_add_cpu_impl (atmi_kernel_t atmi_kernel, atmi_generic_fp impl, const unsigned int ID)

  Add a CPU kernel implementation.
- atmi_status_t atmi_kernel_release (atmi_kernel_t kernel)

  Release the kernel and all of its implementations.

3.1.1 Detailed Description

This module includes all kernel-related classes, structs and functions.

3.1.2 Typedef Documentation

3.1.2.1 typedef struct atmi_kernel_s atmi_kernel_t

ATMI kernels are instantiated in two steps. First, an empty kernel is created. Next, architecture specific implementations are added. Each kernel can have several implementations, but should have at least one implementation

3.1.3 Function Documentation

3.1.3.1 atmi_status_t atmi_kernel_add_cpu_impl (atmi_kernel_t *atmi_kernel*, atmi_generic_fp *impl*, const unsigned int *ID*)

An ATMI CPU kernel implementation is identified by a function pointer. The implementation must have the same number of arguments as the kernel. A unique user-specified identifier is associated with each implementation. The advanced user may want to run the specific implementation of the kernel by using the unique identifier in the launch parameter of task launch functions.

Parameters

in	*kernel*	The opaque kernel handle.
in	*impl*	The kernel implementation function pointer.
in	*ID*	The user-specified unique kernel identifier.

Return values

ATMI_STATUS_SUCCESS	The function has executed successfully.
ATMI_STATUS_ERROR	The function encountered errors.
ATMI_STATUS_UNKNOWN	The function encountered errors.

3.1.3.2 atmi_status_t atmi_kernel_add_gpu_impl (atmi_kernel_t *atmi_kernel*, const char * *impl*, const unsigned int *ID*)

An ATMI GPU kernel implementation is identified by a char array. The implementation must have the same number of arguments as the kernel. A unique user-specified identifier is associated with each implementation. The advanced user may want to run the specific implementation of the kernel by using the unique identifier in the launch parameter of task launch functions.

Parameters

in	*kernel*	The opaque kernel handle.
in	*impl*	The kernel implementation name.
in	*ID*	The user-specified unique kernel identifier.

Return values

ATMI_STATUS_SUCCESS	The function has executed successfully.
ATMI_STATUS_ERROR	The function encountered errors.
ATMI_STATUS_UNKNOWN	The function encountered errors.

3.1.3.3 atmi_status_t atmi_kernel_create_empty (atmi_kernel_t * *kernel*, const int *num_args*, const size_t * *arg_sizes*)

ATMI kernels are instantiated in two steps. First, an empty kernel is created. Next, architecture specific implementations are added. Each kernel can have several implementations, but should have at least one implementation. The opaque kernel handle acts as a key to identify the set of kernel implementations.

Parameters

out	*kernel*	The opaque kernel handle.
in	*num_args*	Number of arguments of the kernel. All implementations must have the same number of input arguments. May be 0.
in	*arg_sizes*	Size of each argument. May be NULL only if num_args is 0.

Return values

ATMI_STATUS_SUCCESS	The function has executed successfully.
ATMI_STATUS_ERROR	The function encountered errors.
ATMI_STATUS_UNKNOWN	The function encountered errors.

3.1.3.4 atmi_status_t atmi_kernel_release (atmi_kernel_t *kernel*)

After the kernel is released, its implementations may not be used to launch any ATMI tasks.

Parameters

in	*kernel*	The opaque kernel handle.

Return values

ATMI_STATUS_SUCCESS	The function has executed successfully.
ATMI_STATUS_ERROR	The function encountered errors.
ATMI_STATUS_UNKNOWN	The function encountered errors.

3.2 ATMI Context Setup and Finalize

Functions

- atmi_status_t atmi_init (atmi_devtype_t type)

  Initialize the ATMI runtime environment.
- atmi_status_t atmi_finalize ()

  Finalize the ATMI runtime environment.

3.2.1 Detailed Description

3.2.2 Function Documentation

3.2.2.1 atmi_status_t atmi_finalize ( )

ATMI runtime functions will fail if called after finalize.

Return values

ATMI_STATUS_SUCCESS	The function has executed successfully.
ATMI_STATUS_ERROR	The function encountered errors.
ATMI_STATUS_UNKNOWN	The function encountered errors.

3.2.2.2 atmi_status_t atmi_init (atmi_devtype_t *type*)

All ATMI runtime functions will fail if this function is not called at least once. The user may initialize difference device types at different regions in the program in order for optimization purposes.

Parameters

in	*type*	The types of devices that will be used by the application.

Return values

ATMI_STATUS_SUCCESS	The function has executed successfully.
ATMI_STATUS_ERROR	The function encountered errors.
ATMI_STATUS_UNKNOWN	The function encountered errors.

3.3 ATMI Module

Functions

- atmi_status_t atmi_module_register (const char **filenames, atmi_platform_type_t *types, const int num_modules)

  Register the ATMI code module from file.
- atmi_status_t atmi_module_register_from_memory (void **modules, size_t *module_sizes, atmi_platform_type_t *types, const int num_modules)

  Register the ATMI code module from memory.

3.3.1 Detailed Description

3.3.2 Function Documentation

3.3.2.1 atmi_status_t atmi_module_register (const char ** *filenames*, atmi_platform_type_t * *types*, const int *num_modules*)

Currently, only GPU devices need explicit module registration because of their specific ISAs that require a separate compilation phase. On the other hand, CPU devices execute regular x86 functions that are compiled with the host program.

Parameters

in	*filenames*	A collection of files that contain the GPU modules targeting either the BRIG or AMDGCN platform types. Value cannot be NULL.
in	*types*	A collection of platform types corresponding to the files. Value cannot be NULL.
in	*num_modules*	Size of `filenames` and `types`. Value should be greater than 0.

Return values

ATMI_STATUS_SUCCESS	The function has executed successfully.
ATMI_STATUS_ERROR	The function encountered errors.
ATMI_STATUS_UNKNOWN	The function encountered errors.

3.3.2.2 atmi_status_t atmi_module_register_from_memory (void ** *modules*, size_t * *module_sizes*, atmi_platform_type_t * *types*, const int *num_modules*)

Currently, only GPU devices need explicit module registration because of their specific ISAs that require a separate compilation phase. On the other hand, CPU devices execute regular x86 functions that are compiled with the host program.

Parameters

in	*modules*	A collection of memory regions that contain the GPU modules targeting either the BRIG or AMDGCN platform types. Value cannot be NULL.
in	*module_sizes*	Sizes of each module region in `modules`. Value cannot be NULL.
in	*types*	A collection of platform types corresponding to the modules. Value cannot be NULL.

in	*num_modules*	Size of `modules`. `module_sizes` and `types`. Value should be greater than 0.

Return values

ATMI_STATUS_SUCCESS	The function has executed successfully.
ATMI_STATUS_ERROR	The function encountered errors.
ATMI_STATUS_UNKNOWN	The function encountered errors.

3.4 ATMI Machine

Functions

- atmi_machine_t * atmi_machine_get_info ()

  ATMI's device discovery function to get the current machine's topology.

3.4.1 Detailed Description

3.4.2 Function Documentation

3.4.2.1 atmi_machine_t* atmi_machine_get_info ( )

The `atmi_machine_t` structure is a tree-based representation of the compute and memory elements in the current node. Once ATMI is initialized, this function can be called to retrieve the pointer to this global structure.

Returns

Returns a pointer to a global structure of tyoe `atmi_machine_t`. Returns NULL if ATMI is not initialized.

3.5 ATMI Task

Functions

- atmi_task_handle_t atmi_task_launch (atmi_lparm_t *lparm, atmi_kernel_t kernel, void **args)

  The ATMI task launcher function.
- atmi_status_t atmi_task_wait (atmi_task_handle_t task)

  Wait for a launched task or a data movement operation.
- atmi_status_t atmi_task_group_sync (atmi_task_group_t *group)

  Wait for the launched task group, which could be a group of compute tasks and data movement tasks.

3.5.1 Detailed Description

3.5.2 Function Documentation

3.5.2.1 atmi_status_t atmi_task_group_sync (atmi_task_group_t * *group*)

Parameters

in	*group*	The task group of already launched tasks or an in-flight data movement operations.

Return values

ATMI_STATUS_SUCCESS	The function has executed successfully.
ATMI_STATUS_ERROR	The function encountered errors.
ATMI_STATUS_UNKNOWN	The function encountered errors.

3.5.2.2 atmi_task_handle_t atmi_task_launch (atmi_lparm_t * *lparm,* atmi_kernel_t *kernel,* void ** *args*)

This function is used to launch any ATMI task (CPU or GPU). The `kernel` parameter specifies what has to be launched.The `lparm` structure defines the task's launch parameters, which will guide the ATMI runtime how to launch and manage the task.

Parameters

in	*lparm*	The structure desribing how the task has to be managed.
in	*kernel*	The opaque kernel handle, which denotes what has to be launched.
in	*args*	The bag of arguments all passed by reference. Their sizes should be consistent with the kernel's `arg_sizes` parameter.

Returns

A handle to the ATMI task. The task handle may be used to setup dependencies with other copy and compute tasks or for explicit synchronization by the host.

3.5.2.3 atmi_status_t atmi_task_wait (atmi_task_handle_t *task*)

Parameters

in	*task*	The handle to an already launched task or an in-flight data movement operation.

Return values

ATMI_STATUS_SUCCESS	The function has executed successfully.
ATMI_STATUS_ERROR	The function encountered errors.
ATMI_STATUS_UNKNOWN	The function encountered errors.

3.6 ATMI Data Management

Functions

- atmi_status_t atmi_malloc (void **ptr, size_t size, atmi_mem_place_t place)

  Allocate memory from the specified memory place.
- atmi_status_t atmi_free (void *ptr)

  Frees memory that was previously allocated.
- atmi_status_t atmi_memcpy (void *dest, const void *src, size_t size)

  Syncrhonously copy memory from the source to destination memory locations.
- atmi_task_handle_t atmi_memcpy_async (atmi_cparm_t *cparm, void *dest, const void *src, size_t size)

  Asyncrhonously copy memory from the source to destination memory locations.

3.6.1 Detailed Description

3.6.2 Function Documentation

3.6.2.1 atmi_status_t atmi_free (void * *ptr*)

This function frees memory that was previously allocated by calling `atmi_malloc`. It throws an error otherwise. It is illegal to access a pointer after a call to this function.

Parameters

in	*ptr*	The pointer to the memory that has to be freed.

Return values

ATMI_STATUS_SUCCESS	The function has executed successfully.
ATMI_STATUS_ERROR	The function encountered errors.
ATMI_STATUS_UNKNOWN	The function encountered errors.

3.6.2.2 atmi_status_t atmi_malloc (void ** *ptr*, size_t *size*, atmi_mem_place_t *place*)

This function allocates memory from the specified memory place. If the memory place belongs primarily to the CPU, then the memory will be accessible by other GPUs and CPUs in the system. If the memory place belongs primarily to a GPU, then it cannot be accessed by other devices in the system.

Parameters

in	*ptr*	The pointer to the memory that will be allocated.
in	*size*	The size of the allocation in bytes.
in	*place*	The memory place in the system to perform the allocation.

Return values

ATMI_STATUS_SUCCESS	The function has executed successfully.
ATMI_STATUS_ERROR	The function encountered errors.
ATMI_STATUS_UNKNOWN	The function encountered errors.

3.6.2.3 atmi_status_t atmi_memcpy (void * *dest*, const void * *src*, size_t *size*)

This function assumes that the source and destination regions are non-overlapping. The runtime determines the memory place of the source and the destination and executes the appropriate optimized data movement methodology.

Parameters

in	*dest*	The destination pointer previously allocated by a system allocator or `atmi_malloc`.
in	*src*	The source pointer previously allocated by a system allocator or `atmi_malloc`.
in	*size*	The size of the data to be copied in bytes.

Return values

ATMI_STATUS_SUCCESS	The function has executed successfully.
ATMI_STATUS_ERROR	The function encountered errors.
ATMI_STATUS_UNKNOWN	The function encountered errors.

3.6.2.4 atmi_task_handle_t atmi_memcpy_async (atmi_cparm_t * *cparm*, void * *dest*, const void * *src*, size_t *size*)

This function assumes that the source and destination regions are non-overlapping. The runtime determines the memory place of the source and the destination and executes the appropriate optimized data movement methodology. This function is equivalent to an asynchronous task, which means that it can be used to setup dependencies with other memory copy routines or compute tasks. The `cparm` structure can be used to provide additional information about the copy operation.

Parameters

in	*cparm*	The structure desribing how the copy task has to be managed.
in	*dest*	The destination pointer previously allocated by a system allocator or `atmi_malloc`.
in	*src*	The source pointer previously allocated by a system allocator or `atmi_malloc`.
in	*size*	The size of the data to be copied in bytes.

Returns

A handle to the ATMI task. The task handle may be used to setup dependencies with other copy and compute tasks or for explicit synchronization by the host.

3.7 ATMI CPU Device Runtime

Functions

- atmi_task_handle_t get_atmi_task_handle ()

  Retrieve the task handle of the currently running task. This function is valid only within the body of a CPU task.
- unsigned long get_global_id (unsigned int dim)

  Retrieve the global thread ID of the currently running task. This function is valid only within the body of a CPU task.
- unsigned long get_global_size (unsigned int dim)

  Retrieve the global thread count of the currently running task. This function is valid only within the body of a CPU task.
- unsigned long get_local_id (unsigned int dim)

  Retrieve the local thread ID of the currently running task. This function is valid only within the body of a CPU task.
- unsigned long get_local_size (unsigned int dim)

  Retrieve the local thread count of the currently running task. This function is valid only within the body of a CPU task.
- unsigned long get_group_id (unsigned int dim)

  Retrieve the thread workgroup ID of the currently running task. This function is valid only within the body of a CPU task.
- unsigned long get_num_groups (unsigned int dim)

  Retrieve the thread workgroup count of the currently running task. This function is valid only within the body of a CPU task.

3.7.1 Detailed Description

3.7.2 Function Documentation

3.7.2.1 atmi_task_handle_t get_atmi_task_handle ( )

Returns

A handle to the ATMI CPU task.

3.7.2.2 unsigned long get_global_id (unsigned int *dim*)

Parameters

in	*dim*	The dimension of the CPU task. Valid dimensions are 0, 1 and 2.

Returns

The global thread ID of the ATMI CPU task.

3.7.2.3 unsigned long get_global_size (unsigned int *dim*)

Parameters

in	*dim*	The dimension of the CPU task. Valid dimensions are 0, 1 and 2.

Returns

The global thread count of the ATMI CPU task.

3.7.2.4 unsigned long get_group_id (unsigned int *dim*)

Parameters

in	*dim*	The dimension of the CPU task. Valid dimensions are 0, 1 and 2.

Returns

The thread workgroup ID of the ATMI CPU task. The current ATMI CPU task model assumes the workgroup size of 1 at all times for all dimensions, so this call is equivalent to calling `get_global_id`.

3.7.2.5 unsigned long get_local_id (unsigned int *dim*)

Parameters

in	*dim*	The dimension of the CPU task. Valid dimensions are 0, 1 and 2.

Returns

The local thread ID of the ATMI CPU task. The current ATMI CPU task model assumes the workgroup size of 1 at all times for all dimensions, so this call always returns 0.

3.7.2.6 unsigned long get_local_size (unsigned int *dim*)

Parameters

in	*dim*	The dimension of the CPU task. Valid dimensions are 0, 1 and 2.

Returns

The local thread count of the ATMI CPU task. The current ATMI CPU task model assumes the workgroup size of 1 at all times for all dimensions, so this call always returns 1.

3.7.2.7 unsigned long get_num_groups (unsigned int *dim*)

Parameters

in	*dim*	The dimension of the CPU task. Valid dimensions are 0, 1 and 2.

Returns

The thread workgroup count of the ATMI CPU task. The current ATMI CPU task model assumes the workgroup size of 1 at all times for all dimensions, so this call is equivalent to calling `get_global_size`.

3.8 Enumerated Types

Typedefs

- typedef enum atmi_status_t atmi_status_t

  Status codes.
- typedef enum atmi_devtype_s atmi_devtype_t

  Device Types.
- typedef enum atmi_memtype_s atmi_memtype_t

  Memory Access Type.
- typedef enum atmi_state_s atmi_state_t

  Task States.
- typedef enum atmi_scheduler_s atmi_scheduler_t

  Scheduler Types.
- typedef enum atmi_arg_type_s atmi_arg_type_t

  ATMI data arg types.

Enumerations

- enum atmi_status_t { ATMI_STATUS_SUCCESS =0, ATMI_STATUS_UNKNOWN =1, ATMI_STATUS_ERROR =2 }

  Status codes.
- enum atmi_platform_type_t { BRIG = 0, AMDGCN }

  Platform Types.
- enum atmi_devtype_s {
  ATMI_DEVTYPE_CPU = 0x0001, ATMI_DEVTYPE_iGPU = 0x0010, ATMI_DEVTYPE_dGPU = 0x0100, ATMI_DEVTYPE_GPU = ATMI_DEVTYPE_iGPU | ATMI_DEVTYPE_dGPU,
  ATMI_DEVTYPE_DSP = 0x1000, ATMI_DEVTYPE_ALL = 0x1111 }

  Device Types.
- enum atmi_memtype_s { ATMI_MEMTYPE_FINE_GRAINED = 0, ATMI_MEMTYPE_COARSE_GRAINED = 1, ATMI_MEMTYPE_ANY }

  Memory Access Type.
- enum atmi_state_s {
  ATMI_INITIALIZED = 0, ATMI_READY = 1, ATMI_DISPATCHED = 2, ATMI_COMPLETED = 3,
  ATMI_FAILED = -1 }

  Task States.
- enum atmi_scheduler_s { ATMI_SCHED_NONE = 0, ATMI_SCHED_RR }

  Scheduler Types.
- enum atmi_arg_type_s { ATMI_IN, ATMI_OUT, ATMI_IN_OUT }

  ATMI data arg types.

3.8.1 Detailed Description

3.8.2 Enumeration Type Documentation

3.8.2.1 enum atmi_arg_type_s

Enumerator

ATMI_IN Input argument

ATMI_OUT Output argument

ATMI_IN_OUT In/out argument

3.8.2.2 enum atmi_devtype_s

Enumerator

ATMI_DEVTYPE_CPU CPU

ATMI_DEVTYPE_iGPU Integrated GPU

ATMI_DEVTYPE_dGPU Discrete GPU

ATMI_DEVTYPE_GPU Any GPU

ATMI_DEVTYPE_DSP Digitial Signal Processor

ATMI_DEVTYPE_ALL Union of all device types

3.8.2.3 enum atmi_memtype_s

Enumerator

ATMI_MEMTYPE_FINE_GRAINED Fine grained memory type

ATMI_MEMTYPE_COARSE_GRAINED Coarse grained memory type

ATMI_MEMTYPE_ANY Any memory type

3.8.2.4 enum atmi_platform_type_t

Enumerator

BRIG Target Platform is BRIG (deprecated)

AMDGCN Target Platform is AMD GCN (default)

3.8.2.5 enum atmi_scheduler_s

Enumerator

ATMI_SCHED_NONE No scheduler, all tasks go to the same queue

ATMI_SCHED_RR Round-robin scheduler

3.8.2.6 enum atmi_state_s

Enumerator

ATMI_INITIALIZED Initialized state

ATMI_READY Ready state

ATMI_DISPATCHED Dispatched state

ATMI_COMPLETED Completed state

ATMI_FAILED Failed state

3.8.2.7 enum atmi_status_t

Enumerator

ATMI_STATUS_SUCCESS The function has been executed successfully.

ATMI_STATUS_UNKNOWN A undocumented error has occurred.

ATMI_STATUS_ERROR A generic error has occurred.

3.9 Common ATMI Structures

Classes

- struct atmi_tprofile_s

  ATMI Task Profile Data Structure.
- struct atmi_place_s

  ATMI Compute Place.
- struct atmi_mem_place_s

  ATMI Memory Place.
- struct atmi_device_s

  ATMI Device Structure.
- struct atmi_machine_s

  ATMI Machine Structure.
- struct atmi_task_group_s

  ATMI Task Group Data Structure.
- struct atmi_task_s
- struct atmi_lparm_s

  The ATMI Launch Parameter Data Structure.
- struct atmi_cparm_s

  The ATMI Data Copy Parameter Data Structure.
- struct atmi_data_s

  High-level data abstraction.

Typedefs

- typedef struct atmi_tprofile_s atmi_tprofile_t

  ATMI Task Profile Data Structure.
- typedef struct atmi_place_s atmi_place_t

  ATMI Compute Place.
- typedef struct atmi_mem_place_s atmi_mem_place_t

  ATMI Memory Place.
- typedef struct atmi_device_s atmi_device_t

  ATMI Device Structure.
- typedef struct atmi_machine_s atmi_machine_t

  ATMI Machine Structure.
- typedef struct atmi_task_group_s atmi_task_group_t

  ATMI Task Group Data Structure.
- typedef void * atmi_handle_t

  ATMI Task info structure.
- typedef struct atmi_task_s **atmi_task_t**
- typedef unsigned long int atmi_task_handle_t

  The ATMI task handle.
- typedef struct atmi_lparm_s atmi_lparm_t

  The ATMI Launch Parameter Data Structure.
- typedef struct atmi_cparm_s atmi_cparm_t

  The ATMI Data Copy Parameter Data Structure.
- typedef struct atmi_data_s atmi_data_t

  High-level data abstraction.

Variables

- atmi_task_handle_t NULL_TASK

  The special NULL task handle.

3.9.1 Detailed Description

Chapter 4

Class Documentation

4.1 atmi_context_s Struct Reference

Public Attributes

- int **atmi_id**

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

- atmi.h

4.2 atmi_cparm_s Struct Reference

The ATMI Data Copy Parameter Data Structure.

`#include <atmi.h>`

Public Attributes

- atmi_task_group_t * group
- boolean groupable
- boolean profilable
- boolean synchronous
- int num_required
- atmi_task_handle_t * requires
- atmi_task_t * task_info

4.2.1 Member Data Documentation

4.2.1.1 atmi_task_group_t* atmi_cparm_s::group

Group for this task, Default= NULL

4.2.1.2 boolean atmi_cparm_s::groupable

Create signal for task, default = F

4.2.1.3 int atmi_cparm_s::num_required

of required parent tasks, default 0

4.2.1.4 boolean atmi_cparm_s::profilable

Points to tprofile if metrics desired

4.2.1.5 atmi_task_handle_t* atmi_cparm_s::requires

Array of required parent tasks

4.2.1.6 boolean atmi_cparm_s::synchronous

Async or Sync, default = F (async)

4.2.1.7 atmi_task_t* atmi_cparm_s::task_info

Optional user-created structure to store executed task's information

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

- atmi.h

4.3 atmi_data_s Struct Reference

High-level data abstraction.

`#include <atmi.h>`

Public Attributes

- void * ptr
- unsigned int size
- atmi_mem_place_t place

4.3.1 Member Data Documentation

4.3.1.1 atmi_mem_place_t atmi_data_s::place

The memory placement of data

4.3.1.2 void* atmi_data_s::ptr

The data pointer

4.3.1.3 unsigned int atmi_data_s::size

Data size

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

- atmi.h

4.4 atmi_device_s Struct Reference

ATMI Device Structure.

`#include <atmi.h>`

Public Attributes

- atmi_devtype_t type
- unsigned int memory_pool_count

4.4.1 Member Data Documentation

4.4.1.1 unsigned int atmi_device_s::memory_pool_count

Number of memory regions that are accessible from this device.

4.4.1.2 atmi_devtype_t atmi_device_s::type

Device type

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

- atmi.h

4.5 atmi_kernel_s Struct Reference

Opaque handle representing an ATMI Kernel.

`#include <atmi_runtime.h>`

Public Attributes

- uint64_t handle

4.5.1 Detailed Description

ATMI kernels are instantiated in two steps. First, an empty kernel is created. Next, architecture specific implementations are added. Each kernel can have several implementations, but should have at least one implementation

4.5.2 Member Data Documentation

4.5.2.1 uint64_t atmi_kernel_s::handle

Opaque handle.

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

- atmi_runtime.h

4.6 atmi_lparm_s Struct Reference

The ATMI Launch Parameter Data Structure.

`#include <atmi.h>`

Public Attributes

- unsigned long gridDim [3]
- unsigned long groupDim [3]
- atmi_task_group_t * group
- boolean groupable
- boolean synchronous
- int acquire_scope
- int release_scope
- int num_required
- atmi_task_handle_t * requires
- int num_needs_any
- atmi_task_handle_t * needs_any
- boolean profilable
- int atmi_id
- int kernel_id
- atmi_place_t place
- atmi_task_t * task_info
- atmi_task_handle_t continuation_task

4.6.1 Member Data Documentation

4.6.1.1 int atmi_lparm_s::acquire_scope

Memory model, default = 2

4.6.1.2 int atmi_lparm_s::atmi_id

Constant that PIFs can check for

4.6.1.3 atmi_task_handle_t atmi_lparm_s::continuation_task

The continuation task of this current task

4.6.1.4 unsigned long atmi_lparm_s::gridDim[3]

of global threads for each dimension

4.6.1.5 atmi_task_group_t* atmi_lparm_s::group

Group for this task, Default= NULL

4.6.1.6 boolean atmi_lparm_s::groupable

Create signal for task, default = F

4.6.1.7 unsigned long atmi_lparm_s::groupDim[3]

Thread group size for each dimension

4.6.1.8 int atmi_lparm_s::kernel_id

Kernel ID if more than one kernel per task

4.6.1.9 atmi_task_handle_t* atmi_lparm_s::needs_any

Array of needed parent tasks

4.6.1.10 int atmi_lparm_s::num_needs_any

needed parents, only 1 must complete

4.6.1.11 int atmi_lparm_s::num_required

of required parent tasks, default 0

4.6.1.12 atmi_place_t atmi_lparm_s::place

Compute location to launch this task.

4.6.1.13 boolean atmi_lparm_s::profilable

Points to tprofile if metrics desired

4.6.1.14 int atmi_lparm_s::release_scope

Memory model, default = 2

4.6.1.15 atmi_task_handle_t* atmi_lparm_s::requires

Array of required parent tasks

4.6.1.16 boolean atmi_lparm_s::synchronous

Async or Sync, default = F (async)

4.6.1.17 atmi_task_t* atmi_lparm_s::task_info

Optional user-created structure to store executed task's information

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

- atmi.h

4.7 atmi_machine_s Struct Reference

ATMI Machine Structure.

`#include <atmi.h>`

Public Attributes

- unsigned int device_count_by_type [ATMI_DEVTYPE_ALL]
- atmi_device_t * devices_by_type [ATMI_DEVTYPE_ALL]

4.7.1 Member Data Documentation

4.7.1.1 unsigned int atmi_machine_s::device_count_by_type[ATMI_DEVTYPE_ALL]

The number of devices categorized by the device type

4.7.1.2 atmi_device_t* atmi_machine_s::devices_by_type[ATMI_DEVTYPE_ALL]

The device structures categorized by the device type

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

- atmi.h

4.8 atmi_mem_place_s Struct Reference

ATMI Memory Place.

`#include <atmi.h>`

Public Attributes

- unsigned int node_id
- atmi_devtype_t dev_type
- int dev_id
- int mem_id

4.8.1 Member Data Documentation

4.8.1.1 int atmi_mem_place_s::dev_id

Devices ordered by runtime; -1 for any

4.8.1.2 atmi_devtype_t atmi_mem_place_s::dev_type

CPU, GPU or DSP

4.8.1.3 int atmi_mem_place_s::mem_id

Memory spaces; -1 for any

4.8.1.4 unsigned int atmi_mem_place_s::node_id

node_id = 0 for local computations

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

- atmi.h

4.9 atmi_place_s Struct Reference

ATMI Compute Place.

`#include <atmi.h>`

Public Attributes

- unsigned int node_id
- atmi_devtype_t type
- int device_id
- unsigned long cu_mask

4.9.1 Member Data Documentation

4.9.1.1 unsigned long atmi_place_s::cu_mask

Compute Unit Mask (advanced feature)

4.9.1.2 int atmi_place_s::device_id

Devices ordered by runtime; -1 for any

4.9.1.3 unsigned int atmi_place_s::node_id

node_id = 0 for local computations

4.9.1.4 atmi_devtype_t atmi_place_s::type

CPU, GPU or DSP

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

- atmi.h

4.10 atmi_task_group_s Struct Reference

ATMI Task Group Data Structure.

`#include <atmi.h>`

Public Attributes

- int id
- boolean **ordered**
- atmi_place_t place
- int maxsize

4.10.1 Member Data Documentation

4.10.1.1 int atmi_task_group_s::id

Unique task group identifier

4.10.1.2 int atmi_task_group_s::maxsize

Number of tasks allowed in group

4.10.1.3 atmi_place_t atmi_task_group_s::place

CUs to execute tasks; default: any

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

- atmi.h

4.11 atmi_task_s Struct Reference

Public Attributes

- atmi_handle_t handle
- atmi_state_t state
- atmi_tprofile_t profile
- struct atmi_task_s * continuation

4.11.1 Member Data Documentation

4.11.1.1 struct atmi_task_s* atmi_task_s::continuation

The continuation task of this current task

4.11.1.2 atmi_handle_t atmi_task_s::handle

Temp storage location for current task handle for DP

4.11.1.3 atmi_tprofile_t atmi_task_s::profile

Previously consistent profile information

4.11.1.4 atmi_state_t atmi_task_s::state

Previously consistent state of task

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

- atmi.h

4.12 atmi_tprofile_s Struct Reference

ATMI Task Profile Data Structure.

`#include <atmi.h>`

Public Attributes

- unsigned long int dispatch_time
- unsigned long int ready_time
- unsigned long int start_time
- unsigned long int end_time

4.12.1 Member Data Documentation

4.12.1.1 unsigned long int atmi_tprofile_s::dispatch_time

Timestamp of task dispatch.

4.12.1.2 unsigned long int atmi_tprofile_s::end_time

TImestamp when the task completed execution.

4.12.1.3 unsigned long int atmi_tprofile_s::ready_time

Timestamp when the task's dependencies were all met and ready to be dispatched.

4.12.1.4 unsigned long int atmi_tprofile_s::start_time

Timstamp when the task started execution.

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

- atmi.h

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