



OpenMP 4.0 API C/C++ Syntax Quick Reference Card

OpenMP Application Program Interface (API) is a portable, scalable model that gives parallel programmers a simple and flexible interface for developing portable parallel applications. OpenMP supports multi-platform shared-memory

parallel programming in C/C++ and Fortran on all architectures, including Unix platforms and Windows platforms. See www.openmp.org for specifications.

4.0 Refers to functionality new in version 4.0.

[n.n.n] refers to sections in the OpenMP API specification version 4.0, and [n.n.n] refers to version 3.1.

Directives

An OpenMP executable directive applies to the succeeding structured block or an OpenMP construct. Each directive starts with **#pragma omp**. The remainder of the directive follows the conventions of the C and C++ standards for compiler directives. A *structured-block* is a single statement or a compound statement with a **single** entry at the top and a single exit at the bottom.

parallel [2.5] [2.4]

Forms a team of threads and starts parallel execution.

#pragma omp parallel [*clause*[,] *clause*] ...]

structured-block

clause:

if(*scalar-expression*)
num_threads(*integer-expression*)
default(shared | none)
private(*list*)
firstprivate(*list*)
shared(*list*)
copyin(*list*)
reduction(*reduction-identifier*: *list*)
4.0 proc_bind(master | close | spread)

loop [2.7.1] [2.5.1]

Specifies that the iterations of associated loops will be executed in parallel by threads in the team in the context of their implicit tasks.

#pragma omp for [*clause*[,] *clause*] ...]

for-loops

clause:

private(*list*)
firstprivate(*list*)
lastprivate(*list*)
reduction(*reduction-identifier*: *list*)
schedule(kind[, chunk_size])
collapse(*n*)
ordered
nowait

kind:

- static**: Iterations are divided into chunks of size *chunk_size* and assigned to threads in the team in round-robin fashion in order of thread number.
- dynamic**: Each thread executes a chunk of iterations then requests another chunk until none remain.
- guided**: Each thread executes a chunk of iterations then requests another chunk until no chunks remain to be assigned.
- auto**: The decision regarding scheduling is delegated to the compiler and/or runtime system.
- runtime**: The schedule and chunk size are taken from the *run-sched-var* ICV.

sections [2.7.2] [2.5.2]

A noniterative worksharing construct that contains a set of structured blocks that are to be distributed among and executed by the threads in a team.

#pragma omp sections [*clause*[,] *clause*] ...]

```
{
  [#pragma omp section]
  structured-block
  [#pragma omp section]
  structured-block
}
```

structured-block

}

clause:

private(*list*)
firstprivate(*list*)
lastprivate(*list*)
reduction(*reduction-identifier*: *list*)
nowait

single [2.7.3] [2.5.3]

Specifies that the associated structured block is executed by only one of the threads in the team.

#pragma omp single [*clause*[,] *clause*] ...]

structured-block

clause:

private(*list*)
firstprivate(*list*)
copyprivate(*list*)
nowait

4.0 simd [2.8.1]

Applied to a loop to indicate that the loop can be transformed into a SIMD loop.

#pragma omp simd [*clause*[,] *clause*] ...]

for-loops

clause:

safelen(*length*)
linear(*list*:*linear-step*)
aligned(*list*:*alignment*)
private(*list*)
lastprivate(*list*)
reduction(*reduction-identifier*: *list*)
collapse(*n*)

4.0 declare simd [2.8.2]

Enables the creation of one or more versions that can process multiple arguments using SIMD instructions from a single invocation from a SIMD loop.

```
#pragma omp declare simd [clause[ , ] clause] ...]
#pragma omp declare simd [clause[ , ] clause] ...]
}
```

[...] *function definition or declaration*

clause:

simdlen(*length*)
linear(*argument-list*:*constant-linear-step*)
aligned(*argument-list*:*alignment*)
uniform(*argument-list*)
inbranch
notinbranch

4.0 loop simd [2.8.3]

Specifies that a loop that can be executed concurrently using SIMD instructions, and that those iterations will also be executed in parallel by threads in the team.

#pragma omp for simd [*clause*[,] *clause*] ...]

for-loops

clause:

Any accepted by the **simd** or **for** directives with identical meanings and restrictions.

4.0 target [data] [2.9.1, 2.9.2]

These constructs create a device data environment for the extent of the region. **target** also starts execution on the device.

#pragma omp target data [*clause*[,] *clause*] ...]

structured-block

#pragma omp target [*clause*[,] *clause*] ...]

structured-block

clause:

device(*integer-expression*)
map([*map-type*:] *list*)
if(*scalar-expression*)

4.0 target update [2.9.3]

Makes the corresponding list items in the device data environment consistent with their original list items, according to the specified motion clauses.

#pragma omp target update [*clause*[,] *clause*] ,...]

clause is motion-clause or one of:

device(*integer-expression*)
if(*scalar-expression*)

motion-clause:

to(*list*)
from(*list*)

4.0 declare target [2.9.4]

A declarative directive that specifies that variables and functions are mapped to a device.

#pragma omp declare target

declarations-definition-seq

#pragma omp end declare target

4.0 teams [2.9.5]

Creates a league of thread teams where the master thread of each team executes the region.

#pragma omp teams [*clause*[,] *clause*] ,...]

structured-block

clause:

num_teams(*integer-expression*)
thread_limit(*integer-expression*)
default(shared | none)
private(*list*)
firstprivate(*list*)
shared(*list*)
reduction(*reduction-identifier*: *list*)

4.0 distribute [simd] [2.9.6, 2.9.7]

distribute specifies loops which are executed by the thread teams. **distribute simd** specifies loops which are executed concurrently using SIMD instructions.

#pragma omp distribute [*clause*[,] *clause*] ...]

for-loops

#pragma omp distribute simd [*clause*[,] *clause*] ...]

for-loops

clause:

private(*list*)
firstprivate(*list*)
collapse(*n*)
dist_schedule(kind[, chunk_size])

4.0 distribute parallel for [simd] [2.9.8, 2.9.9]

These constructs specify a loop that can be executed in parallel (using SIMD semantics in the **simd** case) by multiple threads that are members of multiple teams.

#pragma omp distribute parallel for [*clause*[,] *clause*] ...]

for-loops

#pragma omp distribute parallel for simd [*clause*[,] *clause*] ...]

for-loops

clause: See *clause* for **distribute**

Directives (Continued)

parallel loop [2.10.1] [2.6.1]

Shortcut for specifying a **parallel** construct containing one or more associated loops and no other statements.

```
#pragma omp parallel for [clause[ [, ]clause] ...]
for-loop
```

clause: Any accepted by the **parallel** or **for** directives, except the **nowait** clause, with identical meanings and restrictions.

parallel sections [2.10.2] [2.6.2]

Shortcut for specifying a **parallel** construct containing one sections construct and no other statements.

```
#pragma omp parallel sections [clause[ [, ]clause] ...]
{
    #pragma omp section
    structured-block
    #pragma omp section
    structured-block
    ...
}
```

clause: Any of the clauses accepted by the **parallel** or **sections** directives, except the **nowait** clause, with identical meanings and restrictions.

4.0 parallel loop simd [2.10.4]

Shortcut for specifying a **parallel** construct containing one loop SIMD construct and no other statements.

```
#pragma omp parallel for simd [clause[ [, ]clause] ...]
for-loops
```

clause: Any accepted by the **parallel**, **for** or **simd** directives, except the **nowait** clause, with identical meanings and restrictions.

4.0 target teams [2.10.5]

Shortcut for specifying a **target** construct containing a teams construct.

```
#pragma omp target teams [clause[ [, ]clause] ...]
structured-block
```

clause: See *clause* for **target** or **teams**

4.0 teams distribute [simd] [2.10.6, 2.10.7]

Shortcuts for specifying a **teams** construct containing a **distribute [simd]** construct.

```
#pragma omp teams distribute [clause[ [, ]clause] ...]
for-loops
```

```
#pragma omp teams distribute simd [clause[ [, ]clause] ...]
for-loops
```

clause: Any *clause* used for **teams** or **distribute [simd]**

4.0 target teams distribute [simd] [2.10.8, 2.10.9]

Shortcuts for specifying a **target** construct containing a **teams distribute [simd]** construct.

```
#pragma omp target teams distribute [clause[ [, ]clause] ...]
for-loops
```

```
#pragma omp target teams distribute simd [clause[ [, ]clause] ...]
for-loops
```

clause: Any *clause* used for **target** or **teams distribute [simd]**

4.0 teams distribute parallel for [simd] [2.10.10, 12]

Shortcuts for specifying a **teams** construct containing a **distribute parallel for [simd]** construct.

```
#pragma omp teams distribute parallel for [clause[ [, ]clause] ...]
for-loops
```

```
#pragma omp teams distribute parallel for simd [clause[ [, ]clause] ...]
for-loops
```

clause: Any *clause* used for **teams** or **distribute parallel for [simd]**

4.0 target teams distribute parallel for [simd] [2.10.11, 13]

Shortcut for specifying a **target** construct containing a **teams distribute parallel for [simd]** construct.

```
#pragma omp target teams distribute parallel for \
[clause[ [, ]clause] ...]
for-loops
```

```
#pragma omp target teams distribute parallel for simd \
[clause[ [, ]clause] ...]
for-loops
```

clause: Any *clause* used for **target** or **teams distribute parallel for [simd]**

task [2.11.1] [2.7.1]

Defines an explicit task. The data environment of the task is created according to data-sharing attribute clauses on **task** construct and any defaults that apply.

```
#pragma omp task [clause[ [, ]clause] ...]
structured-block
```

clause:

```
if(scalar-expression)
final(scalar-expression)
untied
default(shared | none)
mergeable
private(list)
firstprivate(list)
shared(list)
4.0 depend(dependence-type: list)
```

The list items that appear in the **depend** clause may include array sections.

dependence-type: The generated task will be a dependent task of all previously generated sibling tasks that reference at least one of the list items...

- in**: ...in an **out** or **inout** clause.
- out** and **inout**: ...in an **in**, **out**, or **inout** clause.

taskyield [2.11.2] [2.7.2]

Specifies that the current task can be suspended in favor of execution of a different task.

```
#pragma omp taskyield
```

master [2.12.1] [2.8.1]

Specifies a structured block that is executed by the master thread of the team.

```
#pragma omp master
structured-block
```

critical [2.12.2] [2.8.2]

Restricts execution of the associated structured block to a single thread at a time.

```
#pragma omp critical [(name)]
structured-block
```

barrier [2.12.3] [2.8.3]

Specifies an explicit barrier at the point at which the construct appears.

```
#pragma omp barrier
```

taskwait [2.12.4] [2.8.4], 4.0 taskgroup [2.12.5]

These constructs each specify a wait on the completion of child tasks of the current task. **taskgroup** also waits for descendant tasks.

```
#pragma omp taskwait
```

```
#pragma omp taskgroup
structured-block
```

atomic [2.12.6] [2.8.5]

Ensures that a specific storage location is accessed atomically. [seq_cst] is 4.0.

```
#pragma omp atomic [read | write | update | capture]
(seq_cst)
expression-stmt
```

```
#pragma omp atomic capture (seq_cst)
structured-block
```

where *expression-stmt* may be one of:

if clause is...	expression-stmt:
read	$v = x;$
write	$x = \text{expr};$
update or is not present	$x++; \quad x--; \quad ++x; \quad --x;$ $x \text{ binop} = \text{expr}; \quad x = x \text{ binop } \text{expr};$ $x = \text{expr binop } x;$
capture	$v = x++; \quad v = x--; \quad v = ++x; \quad v = --x;$ $v = x \text{ binop} = \text{expr}; \quad v = x = x \text{ binop } \text{expr};$ $v = x = \text{expr binop } x;$

(Continued >)

atomic (continued)

and where *structured-block* may be one of the following forms:

```

{v = x; x binop= expr;}      {x binop= expr; v = x;}
{v = x; x = x binop expr;}  {v = x; x = expr binop x;}
{x = x binop expr; v = x;}  {x = expr binop x; v = x;}
{v = x; x = expr;}          {v = x; x++;}
{v = x; ++x;}               {++x; v = x;}
{x++; v = x;}               {v = x; x--;}
{v = x; --x;}               {--x; v = x;}
{x--; v = x;}

```

flush [2.12.7] [2.8.6]

Executes the OpenMP flush operation, which makes a thread's temporary view of memory consistent with memory, and enforces an order on the memory operations of the variables.

```
#pragma omp flush [(list)]
```

ordered [2.12.8] [2.8.7]

Specifies a structured block in a loop region that will be executed in the order of the loop iterations.

```
#pragma omp ordered
structured-block
```

4.0 cancel [2.13.1]

Requests cancellation of the innermost enclosing region of the type specified. The **cancel** directive may not be used in place of the statement following an **if**, **while**, **do**, **switch**, or **label**.

```
#pragma omp cancel construct-type-clause[ [, ] if-clause]
```

construct-type-clause:

```
parallel
sections
for
taskgroup
```

if-clause:

```
if(scalar-expression)
```

4.0 cancellation point [2.13.2]

Introduces a user-defined cancellation point at which tasks check if cancellation of the innermost enclosing region of the type specified has been requested.

```
#pragma omp cancellation point construct-type-clause
```

construct-type-clause:

```
parallel
sections
for
taskgroup
```

threadprivate [2.14.2] [2.9.2]

Specifies that variables are replicated, with each thread having its own copy. Each copy of a **threadprivate** variable is initialized once prior to the first reference to that copy.

```
#pragma omp threadprivate(list)
```

list:

A comma-separated list of file-scope, namespace-scope, or static block-scope variables that do not have incomplete types.

4.0 declare reduction [2.15]

Declares a *reduction-identifier* that can be used in a **reduction** clause.

```
#pragma omp declare reduction(reduction-identifier :
typename-list : combiner) [initializer-clause]
```

reduction-identifier: A base language identifier or one of the following operators: **+**, **-**, *****, **&**, **|**, **^**, **&&** and **||**. In C++, this may also be an *operator-function-id*.

typename-list: A list of type names

combiner: An expression

initializer-clause: **initializer (omp_priv = initializer | function-name (argument-list))**

Runtime Library Routines

Return types are shown in green.

Execution environment routines affect and monitor threads, processors, and the parallel environment. The library routines are external functions with “C” linkage.

Execution Environment Routines

omp_set_num_threads [3.2.1] [3.2.1]

Affects the number of threads used for subsequent parallel regions not specifying a `num_threads` clause, by setting the value of the first element of the `nthreads-var` ICV of the current task to `num_threads`.

```
void omp_set_num_threads(int num_threads);
```

omp_get_num_threads [3.2.2] [3.2.2]

Returns the number of threads in the current team. The binding region for an `omp_get_num_threads` region is the innermost enclosing `parallel` region.

```
int omp_get_num_threads(void);
```

omp_get_max_threads [3.2.3] [3.2.3]

Returns an upper bound on the number of threads that could be used to form a new team if a `parallel` construct without a `num_threads` clause were encountered after execution returns from this routine.

```
int omp_get_max_threads(void);
```

omp_get_thread_num [3.2.4] [3.2.4]

Returns the thread number of the calling thread within the current team.

```
int omp_get_thread_num(void);
```

omp_get_num_procs [3.2.5] [3.2.5]

Returns the number of processors that are available to the device at the time the routine is called.

```
int omp_get_num_procs(void);
```

omp_in_parallel [3.2.6] [3.2.6]

Returns *true* if the `active-levels-var` ICV is greater than zero; otherwise it returns *false*.

```
int omp_in_parallel(void);
```

omp_set_dynamic [3.2.7] [3.2.7]

Returns the value of the `dyn-var` ICV, which indicates if dynamic adjustment of the number of threads is enabled or disabled.

```
void omp_set_dynamic(int dynamic_threads);
```

omp_get_dynamic [3.2.8] [3.2.8]

This routine returns the value of the `dyn-var` ICV, which is *true* if dynamic adjustment of the number of threads is enabled for the current task.

```
int omp_get_dynamic(void);
```

4.0 omp_get_cancellation [3.2.9]

Returns the value of the `cancel-var` ICV, which controls the behavior of cancel construct and cancellation points.

```
int omp_get_cancellation(void);
```

omp_set_nested [3.2.10] [3.2.9]

Enables or disables nested parallelism, by setting the `nest-var` ICV.

```
void omp_set_nested(int nested);
```

omp_get_nested [3.2.11] [3.2.10]

Returns the value of the `nest-var` ICV, which indicates if nested parallelism is enabled or disabled.

```
int omp_get_nested(void);
```

omp_set_schedule [3.2.12] [3.2.11]

Affects the schedule that is applied when `runtime` is used as schedule kind.

```
void omp_set_schedule(omp_sched_t kind, int modifier);
```

kind: one of the following, or an implementation-defined schedule:

```
omp_sched_static = 1
omp_sched_dynamic = 2
omp_sched_guided = 3
omp_sched_auto = 4
```

omp_get_schedule [3.2.13] [3.2.12]

Returns the value of `run-sched-var` ICV, which is the schedule applied when `runtime` schedule is used.

```
void omp_get_schedule(
    omp_sched_t *kind, int *modifier);
```

See *kind* above.

omp_get_thread_limit [3.2.14] [3.2.13]

Returns the value of the `thread-limit-var` ICV, which is the maximum number of OpenMP threads available.

```
int omp_get_thread_limit(void);
```

omp_set_max_active_levels [3.2.15] [3.2.14]

Limits the number of nested active parallel regions, by setting `max-active-levels-var` ICV.

```
void omp_set_max_active_levels(int max_levels);
```

omp_get_max_active_levels [3.2.16] [3.2.15]

Returns the value of `max-active-levels-var` ICV, which determines the maximum number of nested active `parallel` regions.

```
int omp_get_max_active_levels(void);
```

omp_get_level [3.2.17] [3.2.16]

For the enclosing device region, returns the `levels-vars` ICV, which is the number of nested `parallel` regions that enclose the task containing the call.

```
int omp_get_level(void);
```

omp_get_ancestor_thread_num [3.2.18] [3.2.17]

Returns, for a given nested level of the current thread, the thread number of the ancestor of the current thread.

```
int omp_get_ancestor_thread_num(int level);
```

omp_get_team_size [3.2.19] [3.2.18]

Returns, for a given nested level of the current thread, the size of the thread team to which the ancestor or the current thread belongs.

```
int omp_get_team_size(int level);
```

omp_get_active_level [3.2.20] [3.2.19]

Returns the value of the `active-level-vars` ICV, which determines the number of active, nested `parallel` regions enclosing the task that contains the call.

```
int omp_get_active_level(void);
```

omp_in_final [3.2.21] [3.2.20]

Returns *true* if the routine is executed in a final task region; otherwise, it returns *false*.

```
int omp_in_final(void);
```

4.0 omp_get_proc_bind [3.2.22]

Returns the thread affinity policy to be used for the subsequent nested `parallel` regions that do not specify a `proc_bind` clause.

```
omp_proc_bind_t omp_get_proc_bind(void);
```

Returns one of:

```
omp_proc_bind_false = 0
omp_proc_bind_true = 1
omp_proc_bind_master = 2
omp_proc_bind_close = 3
omp_proc_bind_spread = 4
```

4.0 omp_set_default_device [3.2.23]

Controls the default target device by assigning the value of the `default-device-var` ICV.

```
void omp_set_default_device(int device_num);
```

4.0 omp_get_default_device [3.2.24]

Returns the default target device.

```
int omp_get_default_device(void);
```

4.0 omp_get_num_devices [3.2.25]

Returns the number of target devices.

```
int omp_get_num_devices(void);
```

4.0 omp_get_num_teams [3.2.26]

Returns the number of teams in the current `teams` region, or 1 if called from outside of a `teams` region.

```
int omp_get_num_teams(void);
```

4.0 omp_get_team_num [3.2.27]

Returns the team number of calling thread. The team number is an integer between 0 and one less than the value returned by `omp_get_num_teams`, inclusive.

```
int omp_get_team_num(void);
```

4.0 omp_is_initial_device [3.2.28]

Returns *true* if the current task is executing on the host device; otherwise, it returns *false*.

```
int omp_is_initial_device(void);
```

Lock Routines

General-purpose lock routines. Two types of locks are supported: *simple locks* and *nestable locks*. A nestable lock can be set multiple times by the same task before being unset; a simple lock cannot be set if it is already owned by the task trying to set it.

Initialize lock [3.3.1] [3.3.1]

Initialize an OpenMP lock.

```
void omp_init_lock(omp_lock_t *lock);
```

```
void omp_init_nest_lock(omp_nest_lock_t *lock);
```

Destroy lock [3.3.2] [3.3.2]

Ensure that the OpenMP lock is uninitialized.

```
void omp_destroy_lock(omp_lock_t *lock);
```

```
void omp_destroy_nest_lock(omp_nest_lock_t *lock);
```

Set lock [3.3.3] [3.3.3]

Sets an OpenMP lock. The calling task region is suspended until the lock is set.

```
void omp_set_lock(omp_lock_t *lock);
```

```
void omp_set_nest_lock(omp_nest_lock_t *lock);
```

Unset lock [3.3.4] [3.3.4]

Unsets an OpenMP lock.

```
void omp_unset_lock(omp_lock_t *lock);
```

```
void omp_unset_nest_lock(omp_nest_lock_t *lock);
```

Test lock [3.3.5] [3.3.5]

Attempt to set an OpenMP lock but do not suspend execution of the task executing the routine.

```
int omp_test_lock(omp_lock_t *lock);
```

```
int omp_test_nest_lock(omp_nest_lock_t *lock);
```

Timing Routines

Timing routines support a portable wall clock timer. These record elapsed time per-thread and are not guaranteed to be globally consistent across all the threads participating in an application.

omp_get_wtime [3.4.1] [3.4.1]

Returns elapsed wall clock time in seconds.

```
double omp_get_wtime(void);
```

omp_get_wtick [3.4.2] [3.4.2]

Returns the precision of the timer (seconds between ticks) used by `omp_get_wtime`.

```
double omp_get_wtick(void);
```


Environment Variables [4]

Environment variable names are upper case, and the values assigned to them are case insensitive and may have leading and trailing white space.

4.0 [4.11] OMP_CANCELLATION *policy*

Sets the *cancel-var* ICV. *policy* may be **true** or **false**. If **true**, the effects of the cancel construct and of cancellation points are enabled and cancellation is activated

4.0 [4.13] OMP_DEFAULT_DEVICE *device*

Sets the *default-device-var* ICV that controls the default device number to use in device constructs.

4.0 [4.12] OMP_DISPLAY_ENV *var*

If *var* is **TRUE**, instructs the runtime to display the OpenMP version number and the value of the ICVs associated with the environment variables as *name=value* pairs. If *var* is **VERBOSE**, the runtime may also display vendor-specific variables. If *var* is **FALSE**, no information is displayed.

[4.3] [4.3] OMP_DYNAMIC *dynamic*

Sets the *dyn-var* ICV. If **true**, the implementation may dynamically adjust the number of threads to use for executing **parallel** regions.

[4.9] [4.8] OMP_MAX_ACTIVE_LEVELS *levels*

Sets the *max-active-levels-var* ICV that controls the maximum number of nested active **parallel** regions.

[4.6] [4.5] OMP_NESTED *nested*

Sets the *nest-var* ICV to enable or to disable nested parallelism. Valid values for *nested* are **true** or **false**.

[4.2] [4.2] OMP_NUM_THREADS *list*

Sets the *nthreads-var* ICV for the number of threads to use for **parallel** regions.

4.0 [4.5] OMP_PLACES *places*

Sets the *place-partition-var* ICV that defines the OpenMP places available to the execution environment. *places* is an abstract name (**threads**, **cores**, **sockets**, or implementation-defined), or a list of non-negative numbers.

[4.4] [4.4] OMP_PROC_BIND *policy*

Sets the value of the global *bind-var* ICV, which sets the thread affinity policy to be used for parallel regions at the corresponding nested level. *policy* can be the values **true**, **false**, or a comma-separated list of **master**, **close**, or **spread** in quotes.

[4.1] [4.1] OMP_SCHEDULE *type[,chunk]*

Sets the *run-sched-var* ICV for the runtime schedule type and chunk size. Valid OpenMP schedule types are **static**, **dynamic**, **guided**, or **auto**.

[4.7] [4.6] OMP_STACKSIZE *size[B | K | M | G]*

Sets the *stacksize-var* ICV that specifies the size of the stack for threads created by the OpenMP implementation. *size* is a positive integer that specifies stack size. If unit is not specified, *size* is measured in kilobytes (K).

[4.10] [4.9] OMP_THREAD_LIMIT *limit*

Sets the *thread-limit-var* ICV that controls the number of threads participating in the OpenMP program.

[4.8] [4.7] OMP_WAIT_POLICY *policy*

Sets the *wait-policy-var* ICV that provides a hint to an OpenMP implementation about the desired behavior of waiting threads. Valid values for *policy* are **ACTIVE** (waiting threads consume processor cycles while waiting) and **PASSIVE**.

Clauses

The set of clauses that is valid on a particular directive is described with the directive. Most clauses accept a comma-separated list of list items. All list items appearing in a clause must be visible, according to the scoping rules of the base language. Not all of the clauses listed in this section are valid on all directives. The set of clauses that is valid on a particular directive is described with the directive.

Data Sharing Attribute Clauses [2.14.3] [2.9.3]

Data-sharing attribute clauses apply only to variables whose names are visible in the construct on which the clause appears.

default(*shared | none*)

Explicitly determines the default data-sharing attributes of variables that are referenced in a **parallel**, **task**, or **teams** construct, causing all variables referenced in the construct that have implicitly determined data-sharing attributes to be shared.

shared(*list*)

Declares one or more list items to be shared by tasks generated by a **parallel**, **task**, or **teams** construct. The programmer must ensure that storage shared by an explicit **task** region does not reach the end of its lifetime before the explicit task region completes its execution.

private(*list*)

Declares one or more list items to be private to a task or a SIMD lane. Each task that references a list item that appears in a **private** clause in any statement in the construct receives a new list item.

firstprivate(*list*)

Declares list items to be private to a task, and initializes each of them with the value that the corresponding original item has when the construct is encountered.

lastprivate(*list*)

Declares one or more list items to be private to an implicit task or to a SIMD lane, and causes the corresponding original list item to be updated after the end of the region.

4.0 linear(*list[:linear-step]*)

Declares one or more list items to be private to a SIMD lane and to have a linear relationship with respect to the iteration space of a loop.

reduction(*reduction-identifier: list*)

Specifies a *reduction-identifier* and one or more list items. The *reduction-identifier* must match a previously declared *reduction-identifier* of the same name and type for each of the list items.

Operators for reduction (initialization values)			
+	(0)		(0)
*	(1)	^	(0)
-	(0)	&&	(1)
&	(~0)		(0)
max (Least representable number in reduction list item type)			
min (Largest representable number in reduction list item type)			

Data Copying Clauses [2.14.4] [2.9.4]

copyin(*list*)

Copies the value of the master thread's threadprivate variable to the threadprivate variable of each other member of the team executing the **parallel** region.

copyprivate(*list*)

Broadcasts a value from the data environment of one implicit task to the data environments of the other implicit tasks belonging to the **parallel** region.

4.0 Map Clause [2.14.5]

map([*map-type*]:*list*)

Map a variable from the task's data environment to the device data environment associated with the construct. *map-type*:

alloc: On entry to the region each new corresponding list item has an undefined initial value.

to: On entry to the region each new corresponding list item is initialized with the original list item's value.

from: On exit from the region the corresponding list item's value is assigned to each original list item.

(Continued >)

tofrom: (Default) On entry to the region each new corresponding list item is initialized with the original list item's value, and on exit from the region the corresponding list item's value is assigned to each original list item.

4.0 SIMD Clauses [2.8.1]

safelen(*length*)

If used then no two iterations executed concurrently with SIMD instructions can have a greater distance in the logical iteration space than its value.

collapse(*n*)

A constant positive integer expression that specifies how many loops are associated with the loop construct.

simklen(*length*)

A constant positive integer expression that specifies the number of concurrent arguments of the function.

aligned(*argument-list[:alignment]*)

Declares one or more list items to be aligned to the specified number of bytes. *alignment*, if present, must be a constant positive integer expression. If no optional parameter is specified, implementation-defined default alignments for SIMD instructions on the target platforms are assumed.

uniform(*argument-list*)

Declares one or more arguments to have an invariant value for all concurrent invocations of the function in the execution of a single SIMD loop.

inbranch

Specifies that the function will always be called from inside a conditional statement of a SIMD loop.

notinbranch

Specifies that the function will never be called from inside a conditional statement of a SIMD loop.