

POSIX Threads Programming

- In shared memory multiprocessor architectures, such as SMPs, Threads can be used to implement parallelism.
- For UNIX systems, a standardized C language threads programming interface has been specified by the IEEE POSIX 1003.1c standard.
- Thread is defined as an independent stream of instructions that can be scheduled to run as such by the operating system.
- Pthreads are defined as a set of C language programming types and procedure calls, implemented with a pthread.h header/include file.
- Threads has more less creation time corresponding to processes

Creating and Terminating Threads

- `pthread_create (thread,attr,start_routine,arg)`
- `pthread_exit (status)`
- `pthread_attr_init (attr)`
- `pthread_attr_destroy (attr)`

pthread_create

(thread, attr, start_routine, arg)

- pthread_create creates a new thread and makes it executable.
- # thread: An opaque, unique identifier for the new thread returned by the subroutine.
- # attr: An opaque attribute object that may be used to set thread attributes. You can specify a thread attributes object, or NULL for the default values.
- # start_routine: the C routine that the thread will execute once it is created.
- # arg: A single argument that may be passed to start_routine. It must be passed by reference as a pointer cast of type void. NULL may be used if no argument is to be passed.

Thread Attributes and Terminating

- Thread Attributes: `pthread_attr_init` and `pthread_attr_destroy` are used to initialize/destroy the thread attribute object.
- Terminating Threads: `pthread_exit` is used to explicitly exit a thread.
- `gcc -D_POSIX_C_SOURCE -lpthread example1.c -o example1`
- `gcc -D_POSIX_C_SOURCE -lpthread example2.c -o example2`

Joining and Detaching Threads

- `pthread_join (threadid,status)`
- `pthread_detach (threadid,status)`
- `pthread_attr_setdetachstate (attr,detachstate)`
- `pthread_attr_getdetachstate (attr,detachstate)`

Joining and Detaching Threads

- The `pthread_join()` subroutine blocks the calling thread until the specified threadid thread terminate
- The programmer is able to obtain the target thread's termination return status if it was specified in the target thread's call to `pthread_exit()`.
- When a thread is created, one of its attributes defines whether it is joinable or detached
- Only threads that are created as joinable can be joined. If a thread is created as detached, it can never be joined.

- `gcc -D_POSIX_C_SOURCE -lpthread
example3.c -o example3`

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Reference:

<http://www.llnl.gov/computing/tutorials/pthreads/>