Introduction to Real-Time Kernels

Task Management

2013-07-16

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Outline

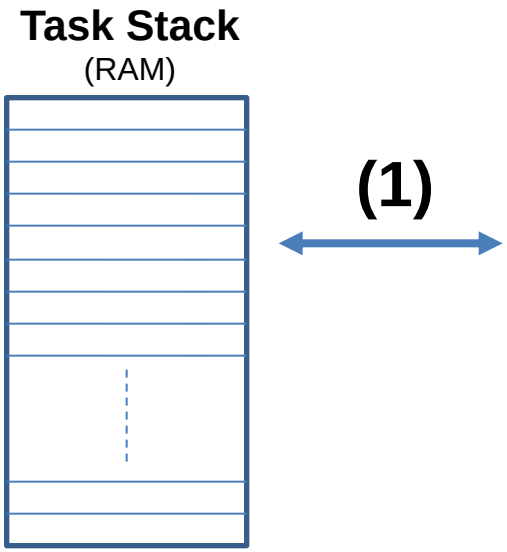
- **Task management:**
  - Task resources
  - Task states
  - Task stacks
    - Setting the size
    - Stack checking
  - Creating tasks
  - Changing the priority of a task at run-time

What is a Task?

```
void  MyTask (void)                          (1)
{
    /* Local Variables     */                (2)

    /* Task initialization */                (3)
    while (1) {                              (4)
        Wait for an event to occur;          (5)
        Process the event;                   (6)
    }
}
```

What is a Task?

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    while (1) {
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    }
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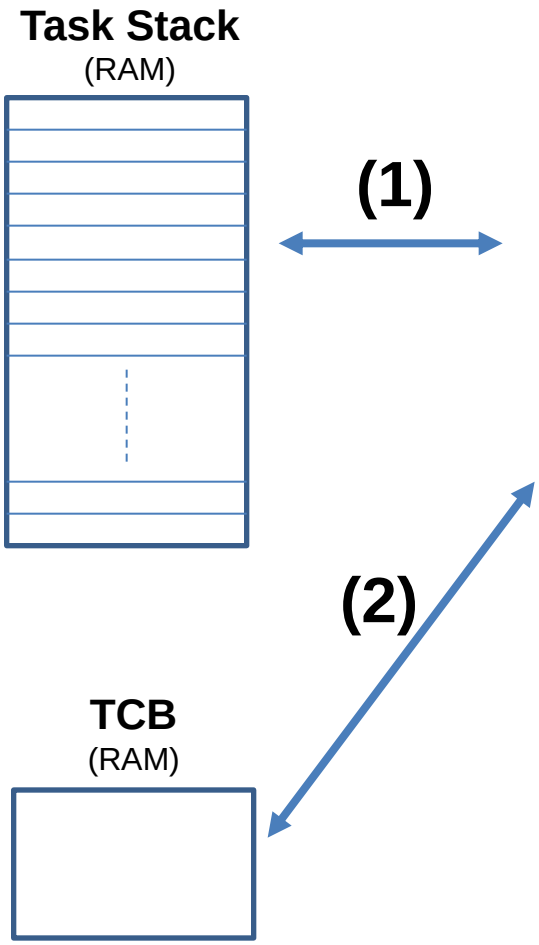


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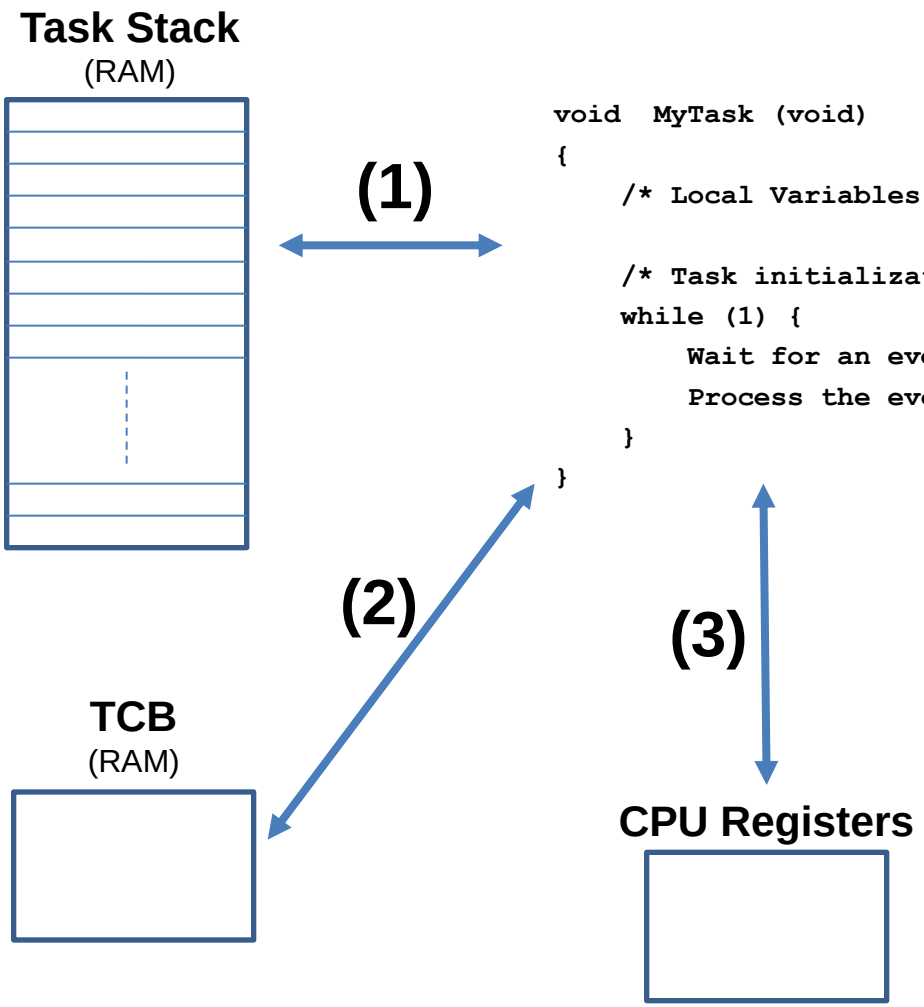


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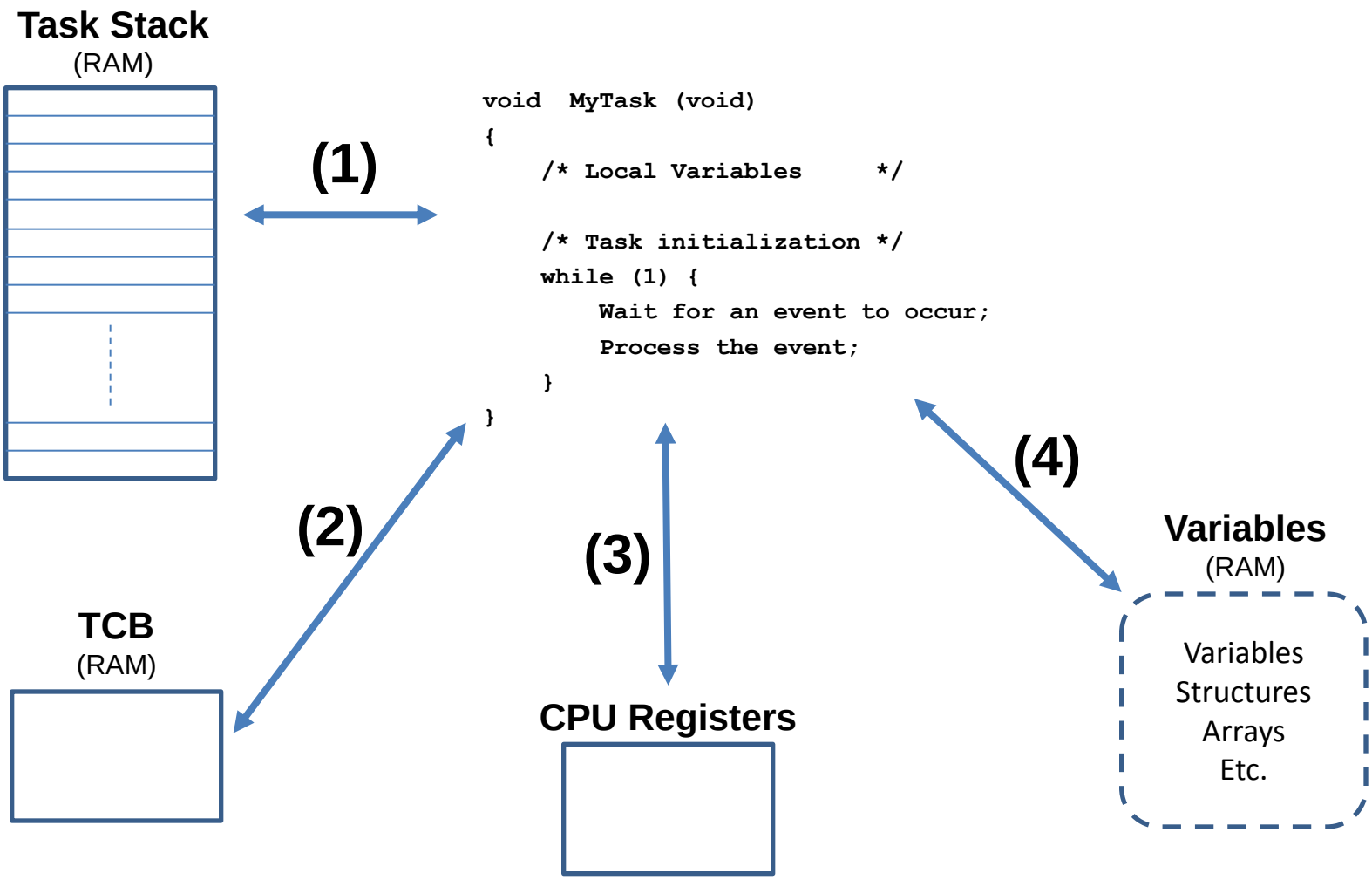
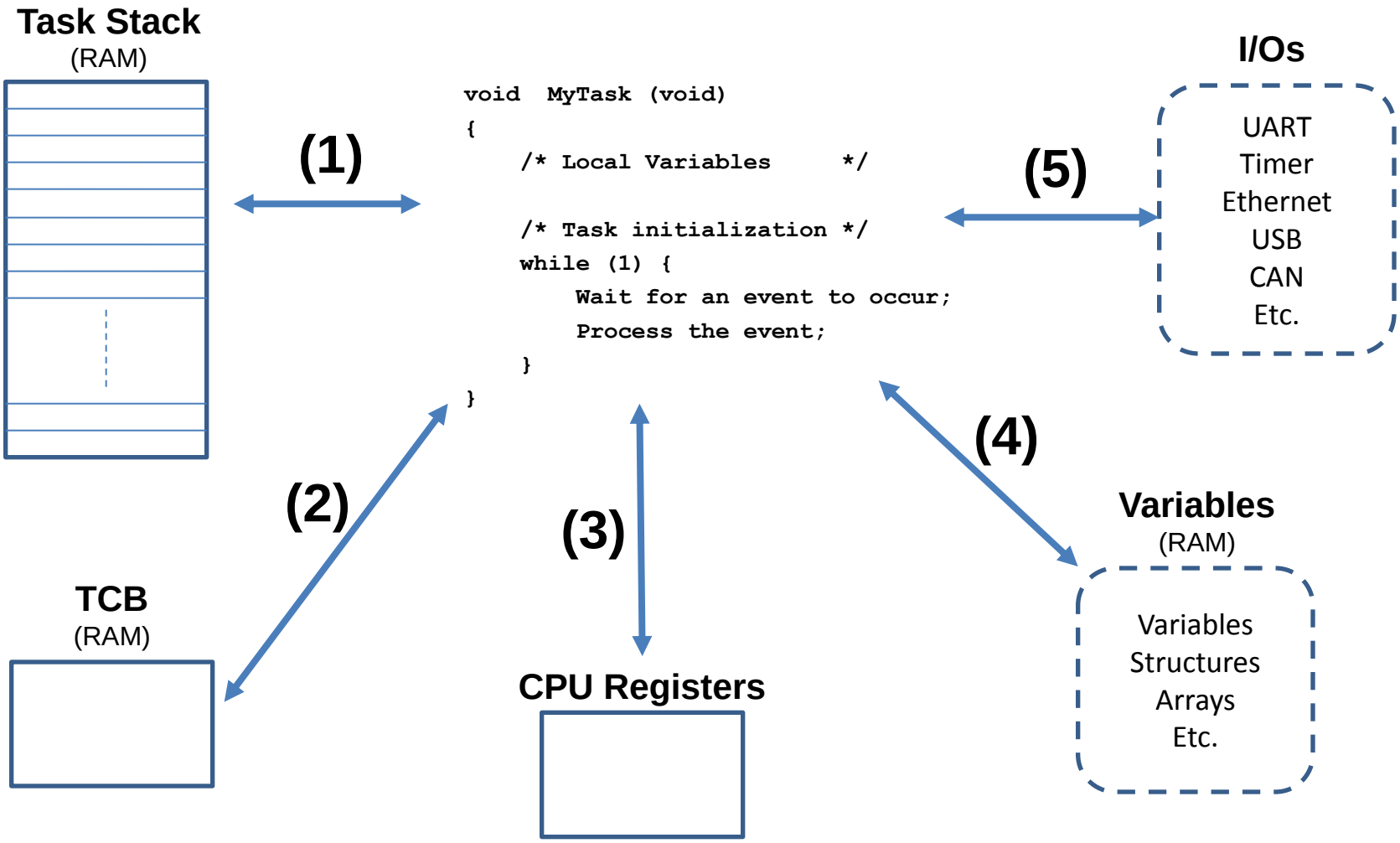
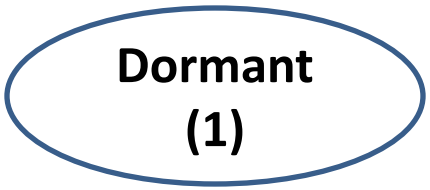


What is a Task?



Task States

Dormant



(b)

```
void  main (void)
{
    OSInit();
    OSTaskCreate (MyTask,
                  My Task Priority,
                  My Task Stack Size,
                  other);
    OSStart()
}
```

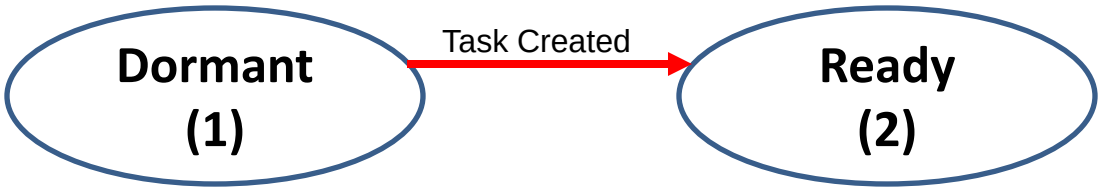
(a)

```
void  MyTask (void)
{
    /* Local Variables     */

    /* Task initialization */
    while (1) {
        Wait for an event to occur;
        Process the event;
    }
}
```

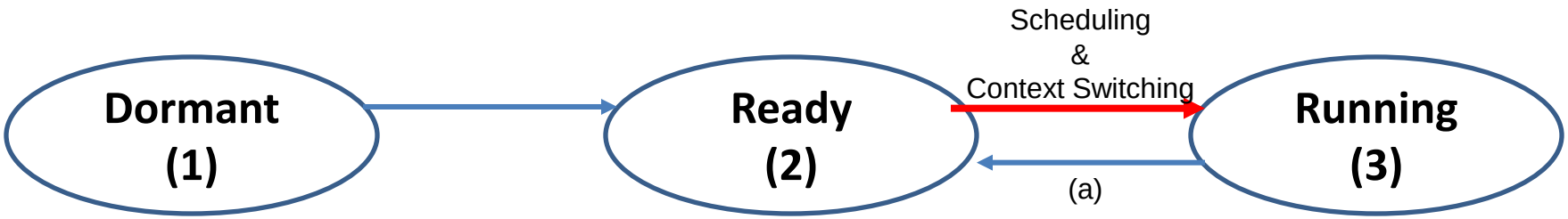
```
KERNEL:
---------------------------------
```

Task States
Ready



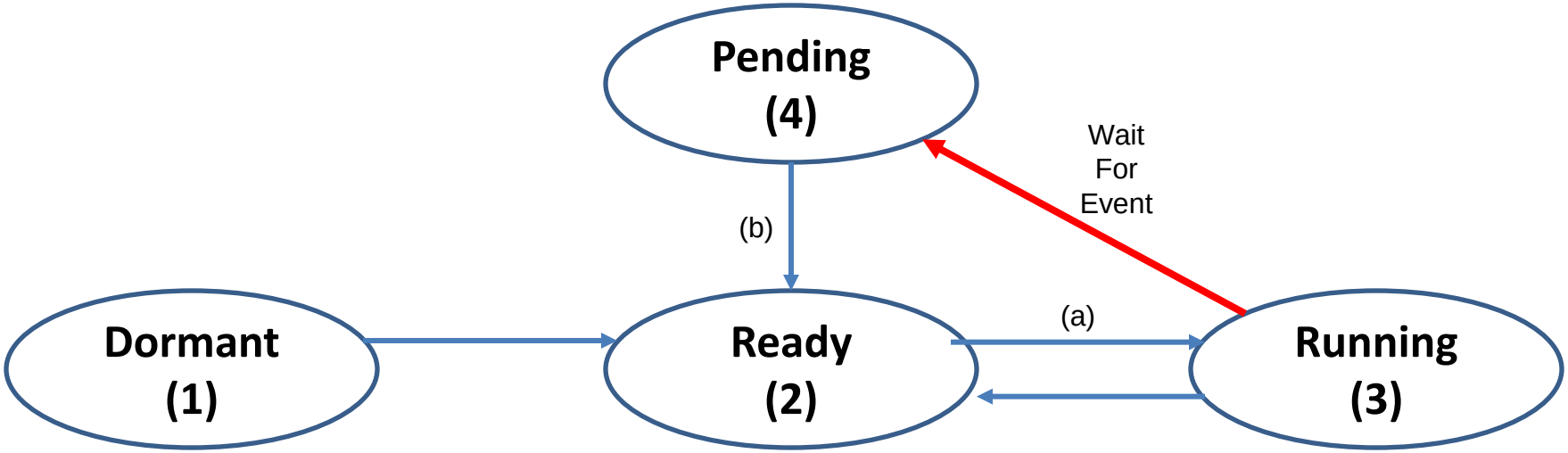
Task States

Running



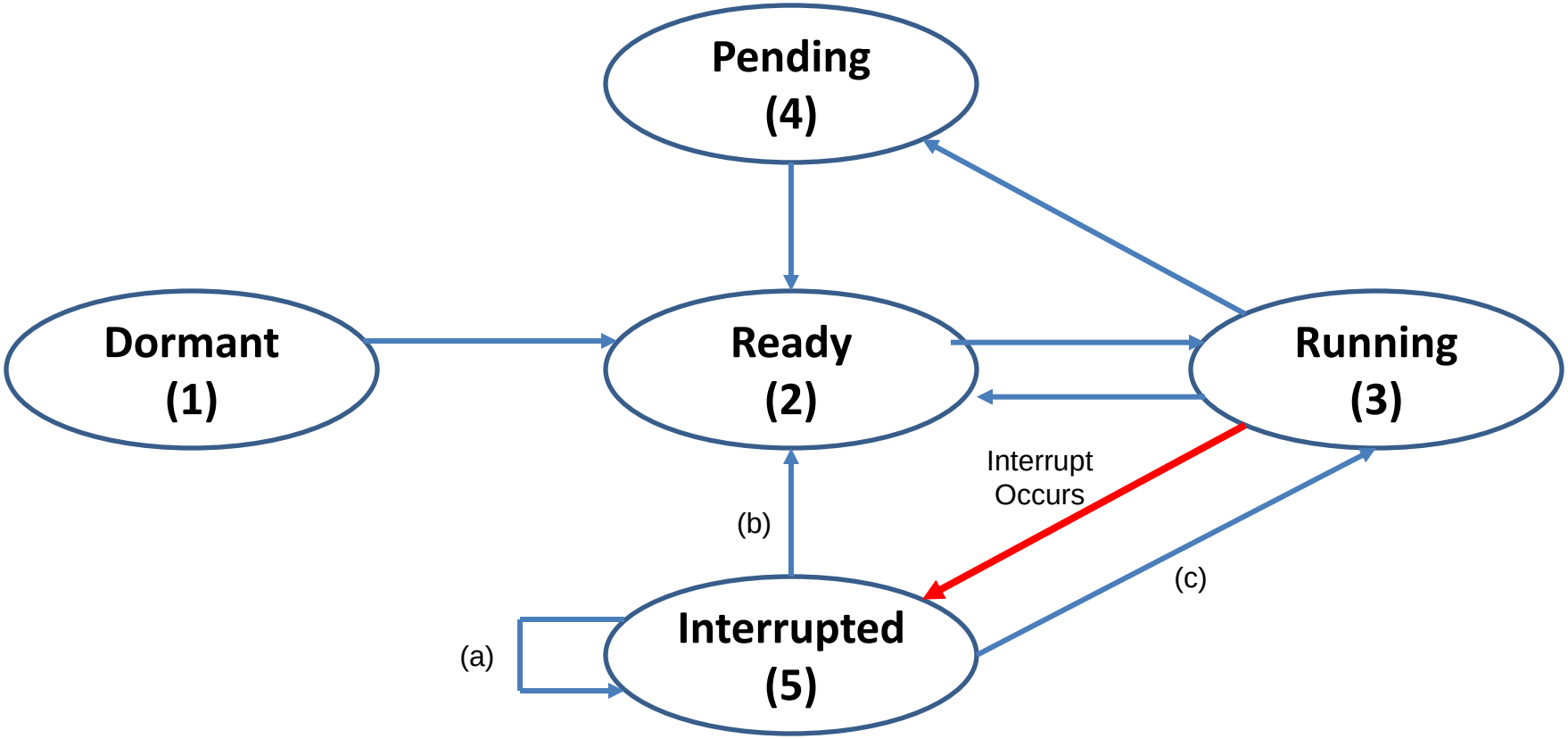
Task States

Pending (a.k.a. Waiting or Blocked)



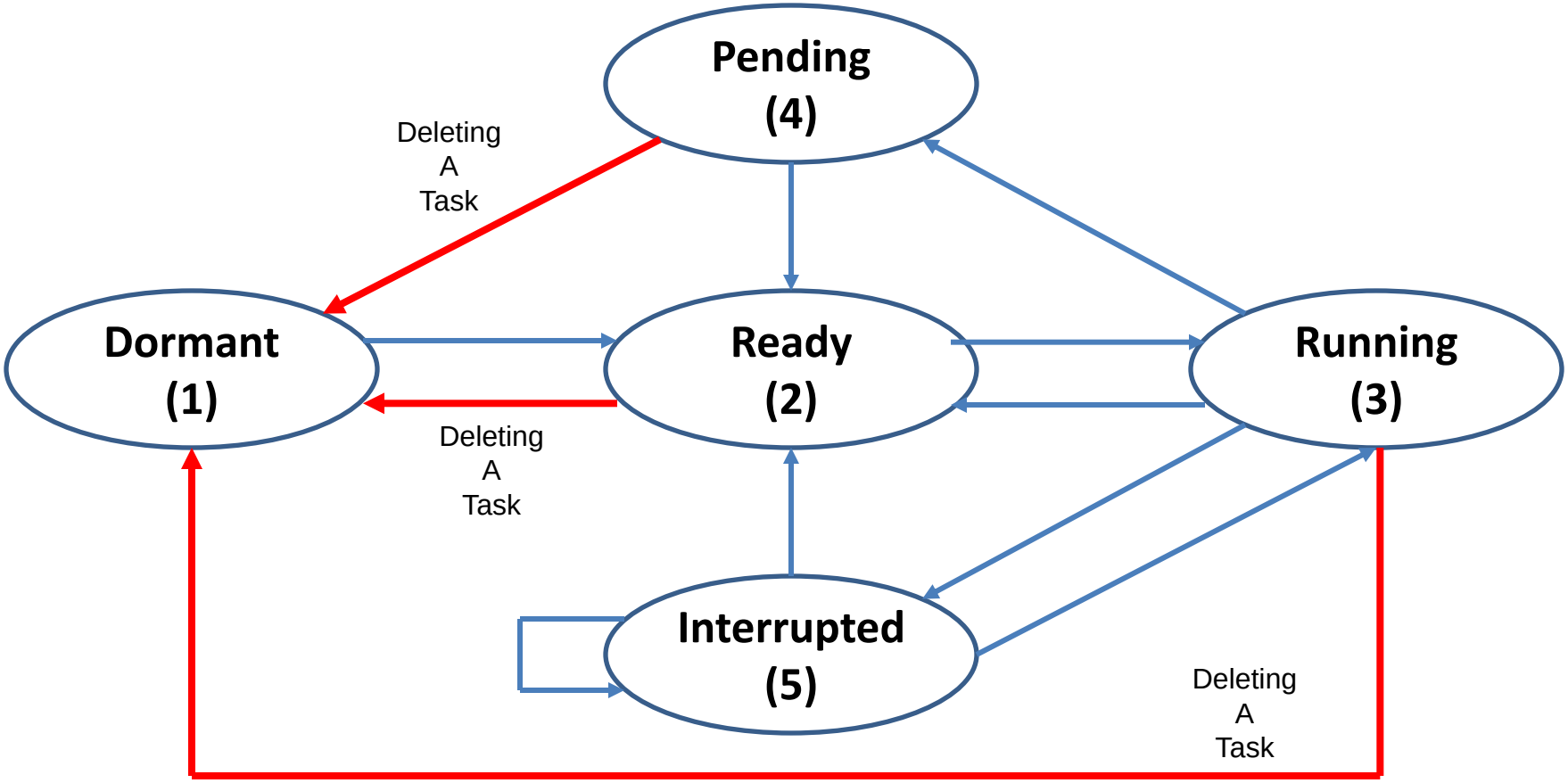
Task States

Task Readies a Higher Priority Task



Task States

Deleting a Task



Changing a Task's Priority

- **Manually**
  - `OSTaskChangePrio(task_id, new_prio);`
  -
- **Automatically**
  - To reduce unbounded priority inversions

Next Class

- **Scheduling**
  - What is scheduling?
  - What is round-robin scheduling?
  - When does scheduling happen?
  - What is the outcome?
- **Context Switching**
  - What is a task's context?
  - How does context Switching work?
- **Servicing Interrupt**
  - Priorities of interrupts
  - Anatomy of an ISR
  - Kernel Aware vs Non-Kernel Aware ISRs