

CS302: Lab12 Report

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Answer 1

`local_intr_save(intr_flag)`的作用：屏蔽中断，相当于上锁的功能。

Answer 2

2.1

Part 1 的算法实现了两个方法。`phi_take_forks_sema`，进入方法的时候通过 `mutex` 上锁，先判断是否有可以拿的筷子，信号量是否大于 0，是的话把自己手里的筷子拿起来，然后再把右边的筷子拿起来。如果这个过程中没有筷子可以拿了，那么会将进程保存入等待队列再打开中断并且调度。然后出临界区，解锁。`phi_put_forks_sema`，进入方法的时候让第 `i` 个哲学家先拿起了右边的筷子，然后再拿起了另一根筷子。这个方法可以解决死锁的问题，因为当有哲学家尝试获取两边筷子的时候会上锁。所以不会出现所有人同时拿着一根筷子然后去尝试拿另一根筷子的情况。

2.2

```
//-----part2-----
void phi_test_sema(int i)
{
    if (state_sema[i] == HUNGRY && state_sema[LEFT] != EATING && state_sema[RIGHT] != EATING)
    {
        state_sema[i] = EATING;
        up(&s[i]);
    }
}
```

(a) captain

```
void phi_take_forks_sema(int i)
{
    down(&mutex);
    state_sema[i] = HUNGRY;
    phi_test_sema(i);
    up(&mutex);
    down(&s[i]);
}
```

(b) take

```
void phi_put_forks_sema(int i)
{
    down(&mutex);
    state_sema[i] = THINKING;
    phi_test_sema(LEFT);
    phi_test_sema(RIGHT);
    up(&mutex);
}
```

(c) put

图 1: Final Solution of Philosopher Eating Problem

```
SWAP: manager = fifo swap manager
++ setup timer interrupts
I am No.4 philosopher sema
Iter 1, No.4 philosopher sema is thinking
I am No.3 philosopher sema
Iter 1, No.3 philosopher sema is thinking
I am No.2 philosopher sema
Iter 1, No.2 philosopher sema is thinking
I am No.1 philosopher sema
Iter 1, No.1 philosopher sema is thinking
I am No.0 philosopher sema
Iter 1, No.0 philosopher sema is thinking
Iter 1, No.0 philosopher sema is eating
Iter 1, No.2 philosopher sema is eating
Iter 2, No.2 philosopher sema is thinking
Iter 1, No.3 philosopher sema is eating
Iter 2, No.0 philosopher sema is thinking
Iter 1, No.1 philosopher sema is eating
Iter 2, No.1 philosopher sema is thinking
Iter 2, No.0 philosopher sema is eating
Iter 2, No.3 philosopher sema is thinking
Iter 2, No.2 philosopher sema is eating
Iter 3, No.2 philosopher sema is thinking
Iter 2, No.0 philosopher sema is eating
Iter 2, No.1 philosopher sema is eating
Iter 3, No.1 philosopher sema is thinking
Iter 3, No.0 philosopher sema is eating
Iter 3, No.3 philosopher sema is thinking
Iter 3, No.2 philosopher sema is eating
Iter 4, No.2 philosopher sema is thinking
Iter 3, No.3 philosopher sema is eating
Iter 4, No.0 philosopher sema is thinking
Iter 3, No.1 philosopher sema is eating
Iter 4, No.1 philosopher sema is thinking

Iter 4, No.0 philosopher sema is eating
Iter 4, No.3 philosopher sema is thinking
Iter 4, No.2 philosopher sema is eating
No.2 philosopher sema quit
Iter 4, No.3 philosopher sema is eating
No.0 philosopher sema quit
Iter 4, No.1 philosopher sema is eating
No.1 philosopher sema quit
No.3 philosopher sema quit
Iter 1, No.4 philosopher sema is eating
Iter 2, No.4 philosopher sema is thinking
Iter 2, No.4 philosopher sema is eating
Iter 3, No.4 philosopher sema is thinking
Iter 3, No.4 philosopher sema is eating
Iter 4, No.4 philosopher sema is thinking
Iter 4, No.4 philosopher sema is eating
No.4 philosopher sema quit
all user-mode processes have quit.
init check memory pass.
kernel panic at kern/process/proc.c:464:
initproc exit.
© (base) ldy12011537@Ludyun-R0G:~/Desktop/OS/
```

图 2: Results Running Part 2