

Homework 7

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1. 答:

```
mutex = 1;
teller_num = n;

Customer:
P(mutex)
number = GetNumber();    //取号
QueuePush(ready_queue, number); //加入等待队列
V(mutex)

Teller:
P(teller_num);
P(mutex)
CallNumber();    //叫号
V(mutex)
Do_Service();    //服务
V(teller_num);
```

2. 答:

```
#include<stdio.h>
#include<stdlib.h>
#include<pthread.h>
#include<semaphore.h>

pthread_mutex_t lock;
pthread_cond_t cond;

struct Stack{
    int top;
    int stack[16];
}mystack;

int tid = 0;

void gettask(int *a, int *b){
    pthread_mutex_lock(&lock);
    if(mystack.top < 2)
        pthread_cond_wait(&cond, &lock);
    *a = mystack.stack[--mystack.top];
    *b = mystack.stack[--mystack.top];
    pthread_mutex_unlock(&lock);
}

void putresult(int res){
    pthread_mutex_lock(&lock);
    mystack.stack[mystack.top++] = res;
    if(mystack.top > 1)
        pthread_cond_signal(&cond);
    pthread_mutex_unlock(&lock);
}

void *thread_func(){
```

```

int a, b, res;
while(mystack.top > 1)    {
    gettask(&a, &b);
    res = a + b;
    usleep(rand() % 9000 + 1000);
    putresult(res);
    printf("thread %d : %d + %d = %d\n", ++tid, a, b, res);
}
}

int main()
{
    int i, err;
    for(i = 0; i < 16; i++)    {
        mystack.stack[i] = rand() % 100;
    }
    mystack.top = 16;
    pthread_t mythread[8];
    pthread_mutex_init(&lock, NULL);
    pthread_cond_init(&cond, NULL);
    for(i = 0; i < 8; i++)    {
        err = pthread_create(&mythread[i], NULL, thread_func, NULL);
        if(err != 0)
            exit(0);
    }
    for(i = 0; i < 8; i++)    {
        err = pthread_join(mythread[i], NULL);
        if(err != 0)
            exit(0);
    }
    return 0;
}

```

运行结果:

```

stu@stu-VirtualBox:~/Desktop$ ./test
thread 1 : 35 + 93 = 128
thread 2 : 0 + 0 = 0
thread 3 : 0 + 0 = 0
thread 4 : 0 + 0 = 0
thread 5 : 0 + 0 = 0
thread 6 : 86 + 83 = 169
thread 7 : 15 + 77 = 92
thread 8 : 92 + 86 = 178
thread 9 : 0 + 128 = 128
thread 10 : 0 + 0 = 0
thread 11 : 169 + 0 = 169
thread 12 : 178 + 92 = 270
thread 13 : 270 + 169 = 439
thread 14 : 0 + 128 = 128
thread 15 : 128 + 439 = 567
stu@stu-VirtualBox:~/Desktop$ 

```