

lab4 实验报告

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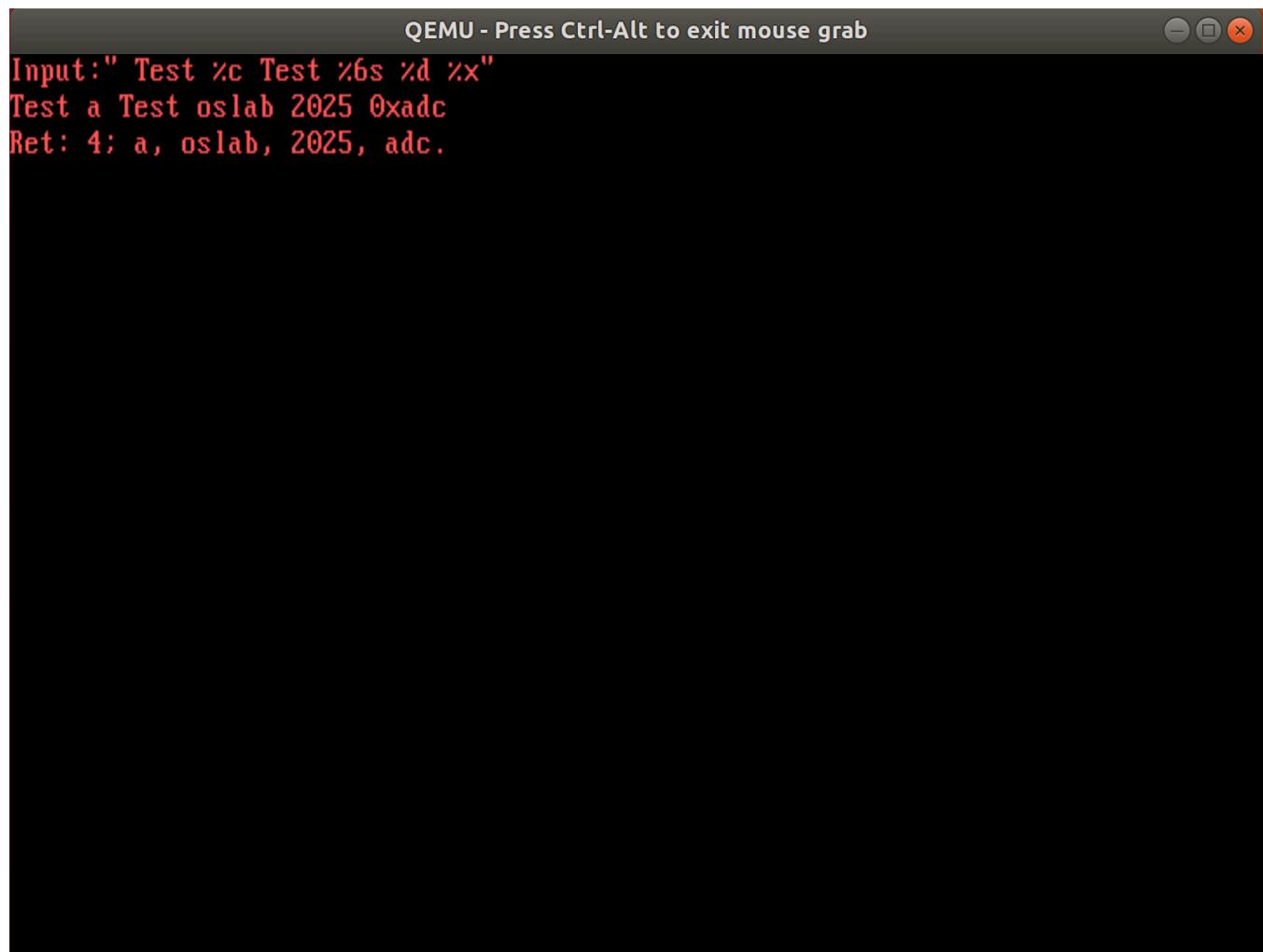
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实验进度

我完成了lab 4.1, lab 4.2, lab 4.3, lab 4.4, 其中lab 4.4实现了生产者-消费者问题。

实验结果



```
QEMU - Press Ctrl-Alt to exit mouse grab
Input:" Test %c Test %6s %d %x"
Test a Test oslab 2025 0xadc
Ret: 4; a, oslab, 2025, adc.
```

QEMU

```
Parent Process: Semaphore Initializing.  
Parent Process: Sleeping.  
Child Process: Semaphore Waiting.  
Child Process: In Critical Area.  
Child Process: Semaphore Waiting.  
Child Process: In Critical Area.  
Child Process: Semaphore Waiting.  
Parent Process: Semaphore Posting.  
Parent Process: Sleeping.  
Child Process: In Critical Area.  
Child Process: Semaphore Waiting.  
Parent Process: Semaphore Posting.  
Parent Process: Sleeping.  
Child Process: In Critical Area.  
Child Process: Semaphore Destroying.  
Parent Process: Semaphore Posting.  
Parent Process: Sleeping.  
Parent Process: Semaphore Posting.  
Parent Process: Semaphore Destroying.  
-
```

QEMU - Press Ctrl-Alt to exit mouse grab

```
=====TEST SHARED VARIABLE=====  
Parent Process: create Shared Variable: 0 with value: 114514  
Child Process: readShared Variable: 0 get value: 114514  
Parent Process: writeShared Variable: 0 with value: -5678  
Child Process: readShared Variable: 0 get value: -5678  
Child Process: writeShared Variable: 0 with value: 2333  
Parent Process: readShared Variable: 0 get value: 2333  
Parent Process: destroyShared Variable: 0
```

```
Producer 2: produce
Producer 3: produce
Consumer: consume
Producer 4: produce
Producer 5: produce
Producer 2: produce
Producer 3: produce
Consumer: consume
Producer 4: produce
Producer 5: produce
Consumer: consume
Consumer: consume
Consumer: consume
Consumer: consume
Consumer: consume
Consumer: consume
```

实验修改的代码位置

lab 4.1

1. kernel/kernel/irqHandle.c:

- void sysReadStdIn(struct StackFrame *sf); // 添加函数实现
- void keyboardHandle(struct StackFrame *sf); // 添加键盘按键的串口回显和控制进程同步的代码

lab 4.2

1. kernel/kernel/irqHandle.c: 添加函数实现

- void sysSemInit(struct StackFrame *sf);
- void sysSemWait(struct StackFrame *sf);
- void sysSemPost(struct StackFrame *sf);
- void sysSemDestroy(struct StackFrame *sf);

lab 4.3

1. kernel/kernel/irqHandle.c: 添加函数实现

- void sysSVarCreate(struct StackFrame *sf);
- void sysSVarDestroy(struct StackFrame *sf);
- void sysSVarRead(struct StackFrame *sf);
- void sysSVarWrite(struct StackFrame *sf);

2. lib/syscall.c: 添加函数实现

- int createSharedVariable(sharedvar_t *svar, int value);
- int destroySharedVariable(sharedvar_t *svar);
- int readSharedVariable(sharedvar_t *svar);
- int writeSharedVariable(sharedvar_t *svar, int value);

3. kernel/kernel/kvm.c: 添加函数实现

- initSharedVariable(void);

lab 4.4

1. lib/lib.h

- 添加宏定义 `#define SYS_GETPID 6`，并修改原有的宏定义 `#define SYS_SEM 7` 和 `#define SYS_SHAREDVAR 8`
- pid_t getpid(); // 添加函数定义

2. lib/syscall.c

- pid_t getpid(); // 添加函数实现

3. kernel/kernel/irqHandle.c

- 添加宏定义 `#define SYS_GETPID 6`，并修改原有的宏定义 `#define SYS_SEM 7` 和 `#define SYS_SHAREDVAR 8`
- void syscallHandle(struct StackFrame *sf); // 添加 case SYS_GETPID
- void sysGetPid(struct StackFrame *sf); // 添加函数定义和实现

4. app/main.c

- 添加宏定义
 - int item[N] = {}
- 添加全局变量
 - sem_t full;
 - sem_t empty;
 - sem_t mutex;
 - int in = 0;
 - int out = 0;
 - int id;
- void produce(); // 添加定义和实现
- void consume(); // 添加定义和实现
- 添加测试程序，每个生产者生产2次，消费者消费8次