Linux进程、线程和调度(2)

讲解时间：5月22-25日晚9点
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麦当劳喜欢您来，喜欢您再来

扫描关注

Linuxer

第二次课大纲

1.fork、vfork、clone
2.写时拷贝技术
3.Linux线程的实现本质
4.进程0和进程1
5.进程的睡眠和等待队列
6.孤儿进程的托孤，SUBREAPER

练习题

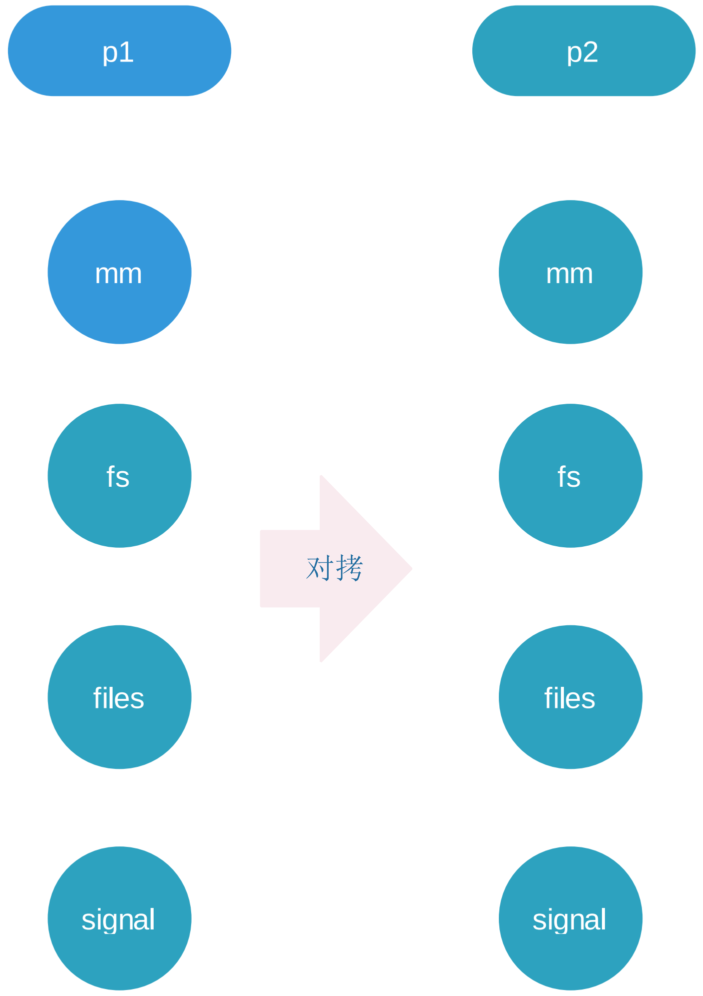
1.fork、vfork、Copy-on-Write例子
2.life-period例子，实验体会托孤
3.pthread_create例子，strace它
4.彻底看懂等待队列的案例

fork

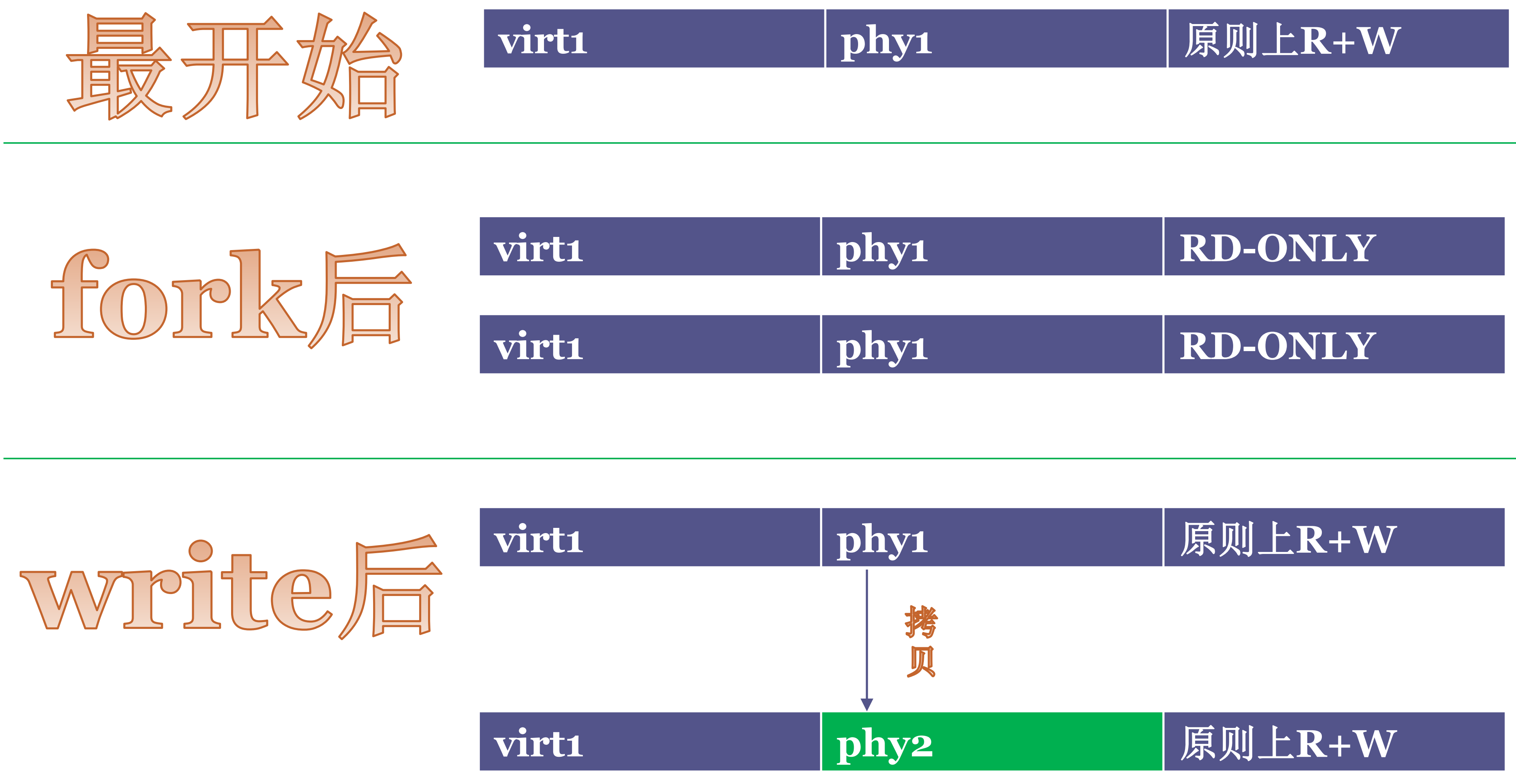
- fork()

1. SIGCHLD

执行一个copy，但是任何修改都造成分裂，如：chroot, open, 写memory，mmap，sigaction....



Copy-on-write



Mmu-less Linux

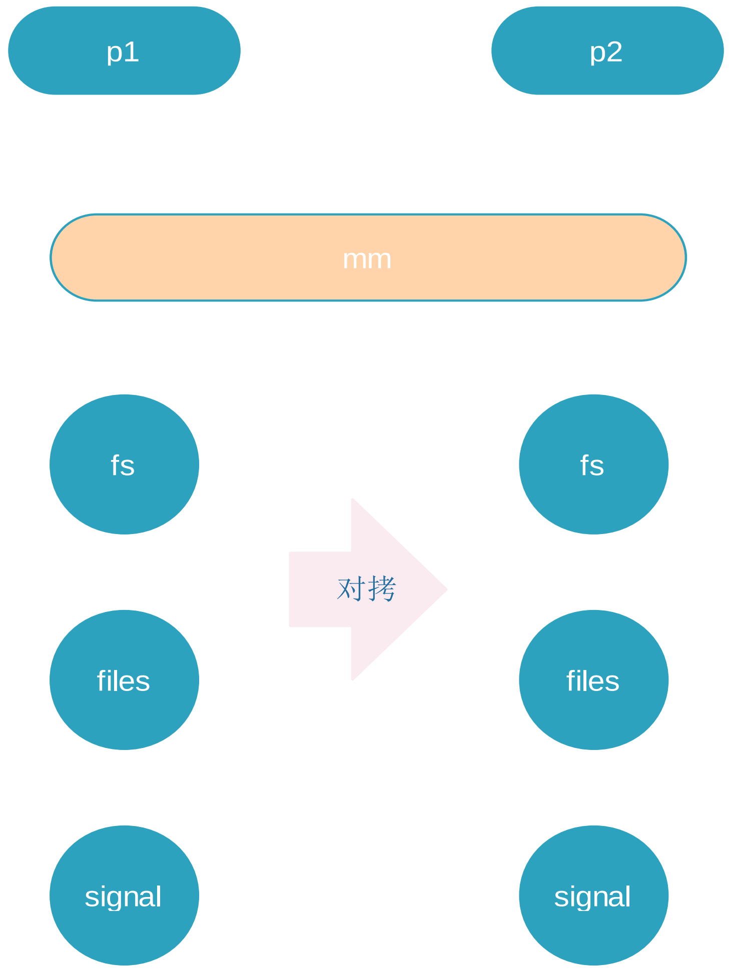
无copy-on-write,没有fork

使用vfork:父进程阻塞直到子进程
1. exit
2. exec

vfork

- vfork()

1. CLONE_VM
2. CLONE_VFORK
3. SIGCHLD

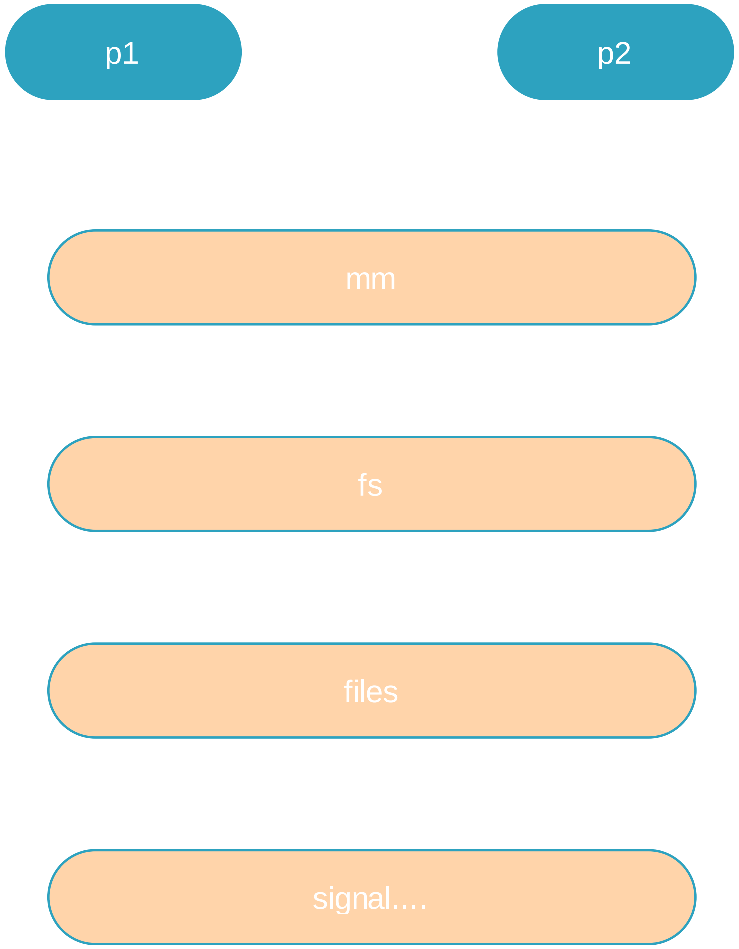


pthread_create-> clone

- clone()

1. CLONE_VM
2. CLONE_FS
3. CLONE_FILES
4. CLONE_SIGHAND
5. CLONE_THREAD

共享资源，可调度

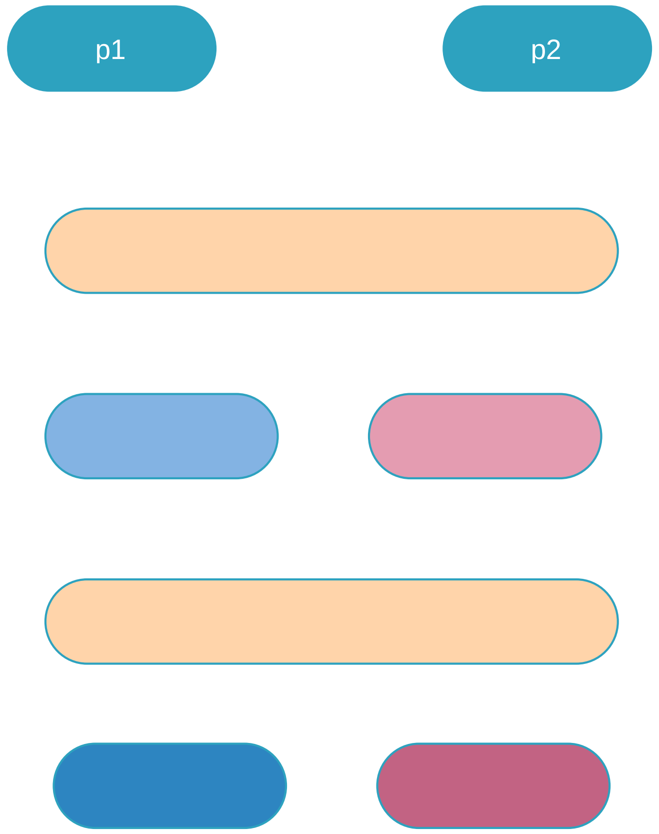


进 程 、 线 程 与 “人 妖”

- clone

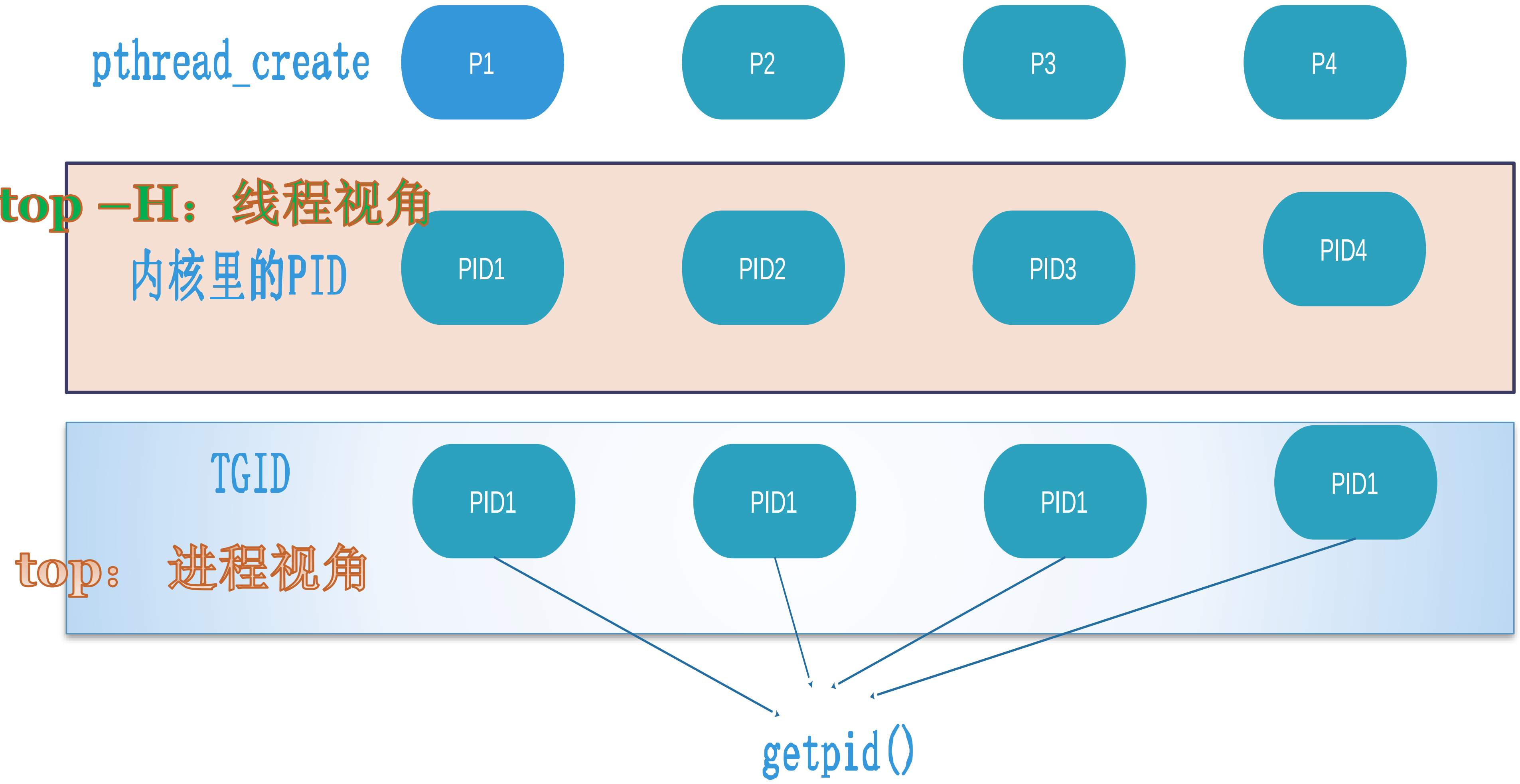
如果我们只clone一部分资源呢？

进程?
线程？
人妖？



妖有了仁慈的心,就不再是妖,是人妖

PID和TGID

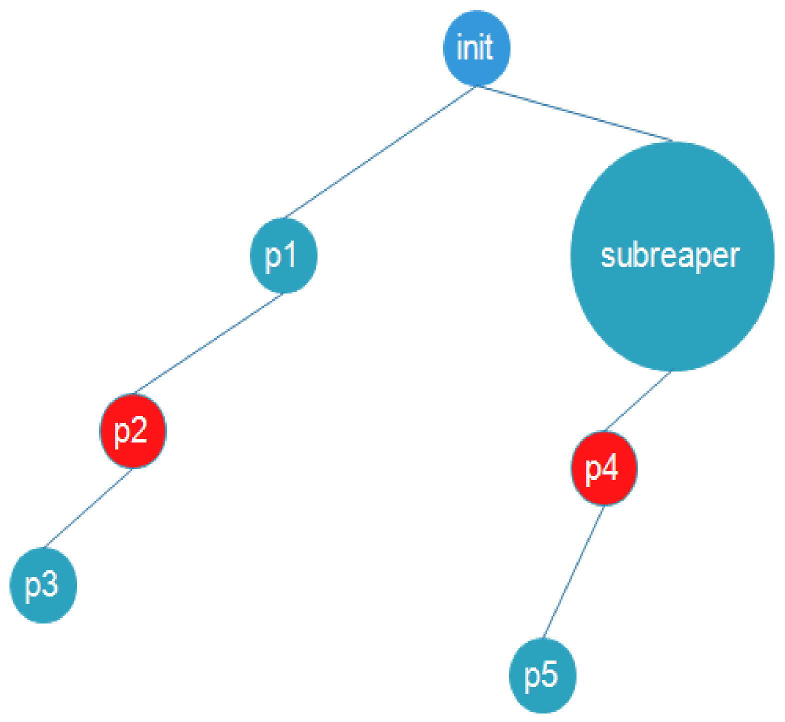

pthread_create
P1
P2
P3
P4
top –H：线程视角
内核里的PID
PID1
PID2
PID3
PID4
TGID
top：进程视角
PID1
PID1
PID1
PID1
getpid()

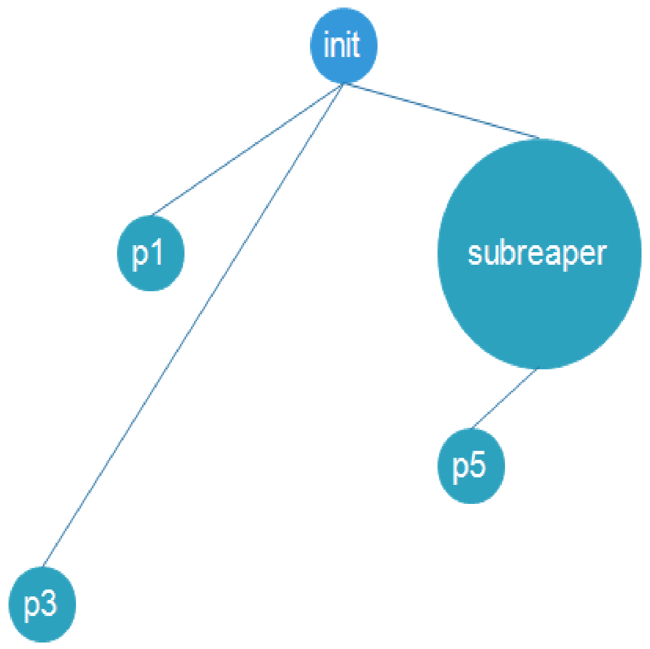
SUBREAPER与托孤

```
/* Become reaper of our children */
if (prctl(PR_SET_CHILD_SUBREAPER, 1) < 0) {
                log_warning("Failed to make us a subreaper: %m");
                if (errno == EINVAL)
                        log_info("Perhaps the kernel version is too old (<
3.4?)");
}
```

PR_SET_CHILD_SUBREAPER 是 Linux 3.4 加入的新特性。把它设置为非零值，当前进程就会变成 subreaper，会像 1 号进程那样收养孤儿进程了。

init vs. SUBREAPER

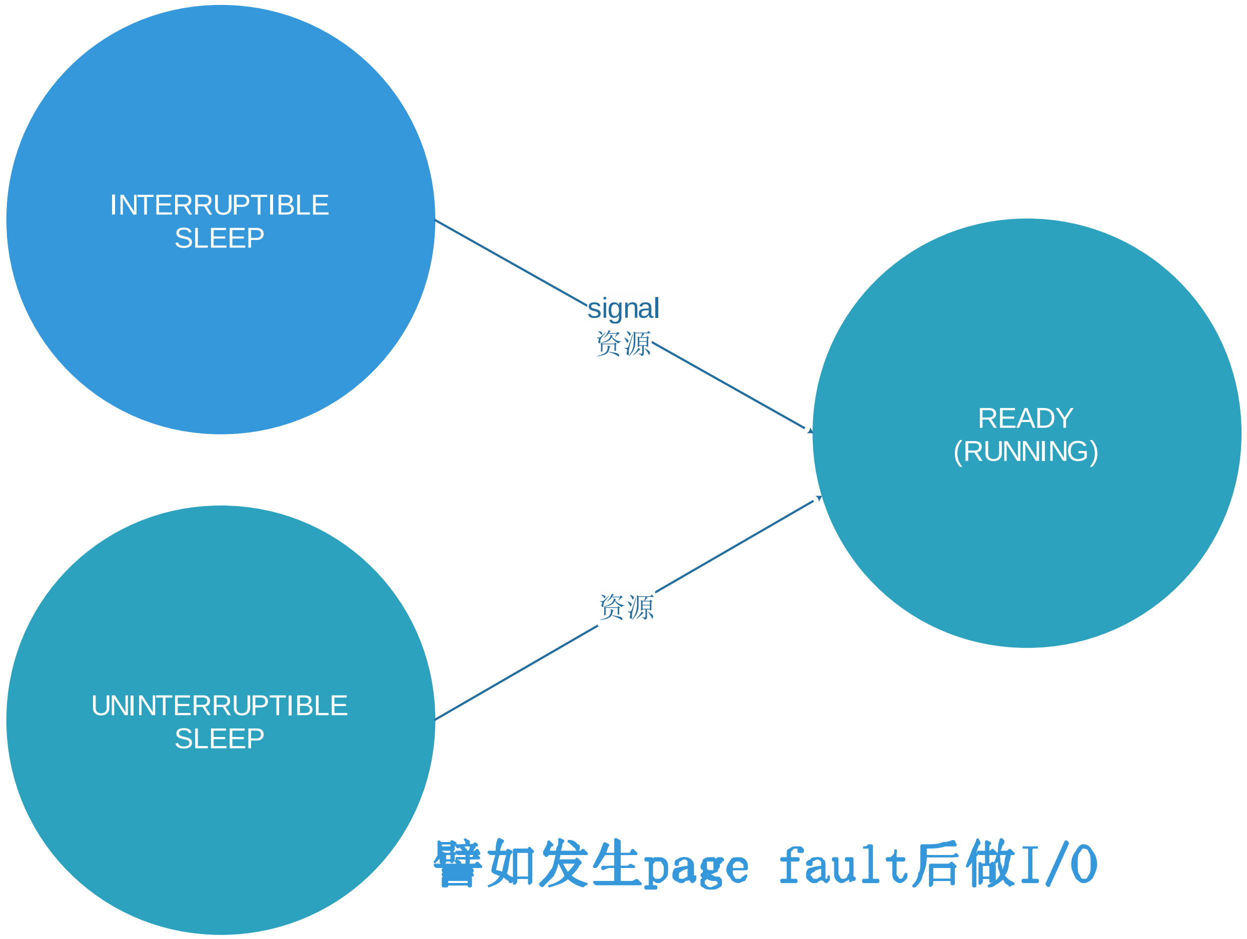




p2和p4死

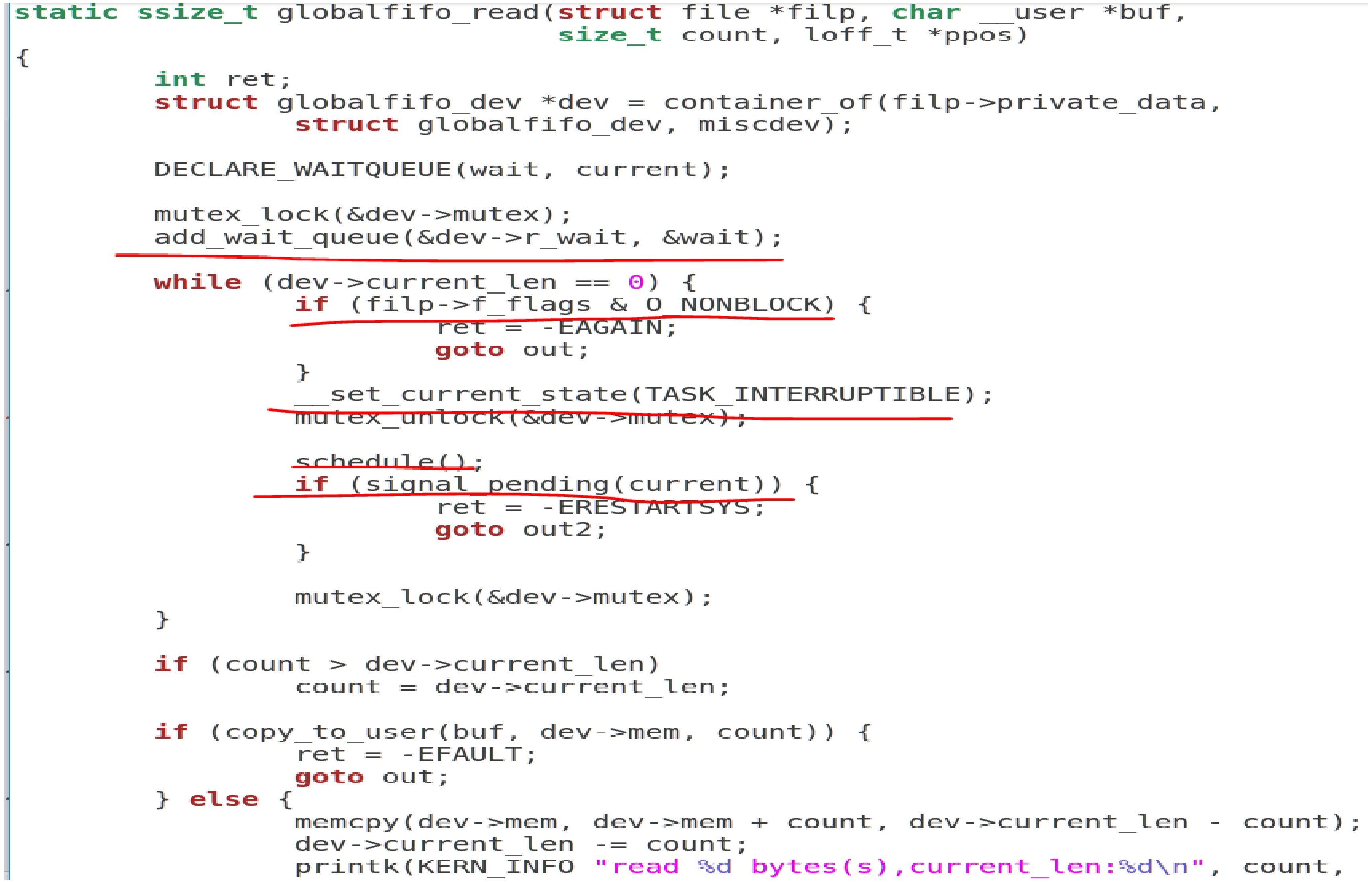
睡 眠

深度睡眠 vs. 浅度睡眠



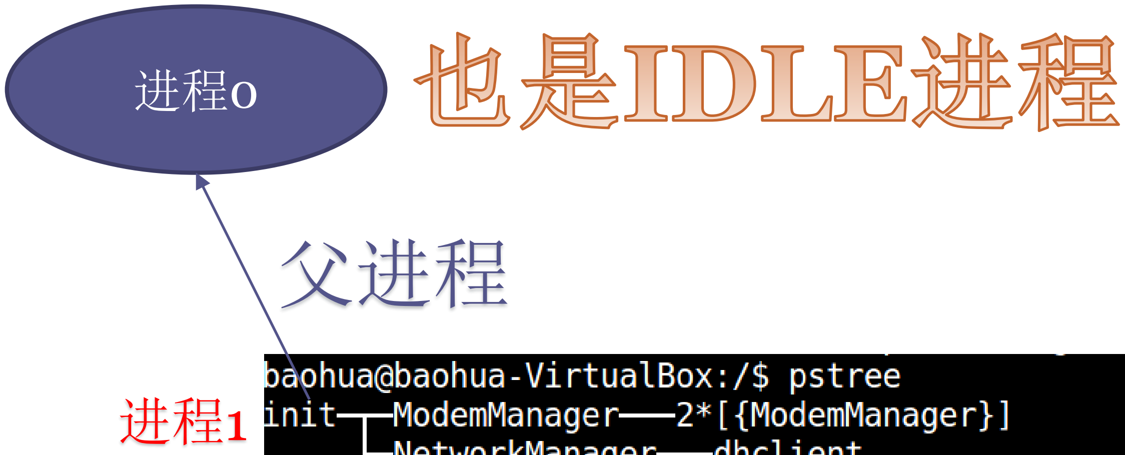
譬如发生page fault后做I/O

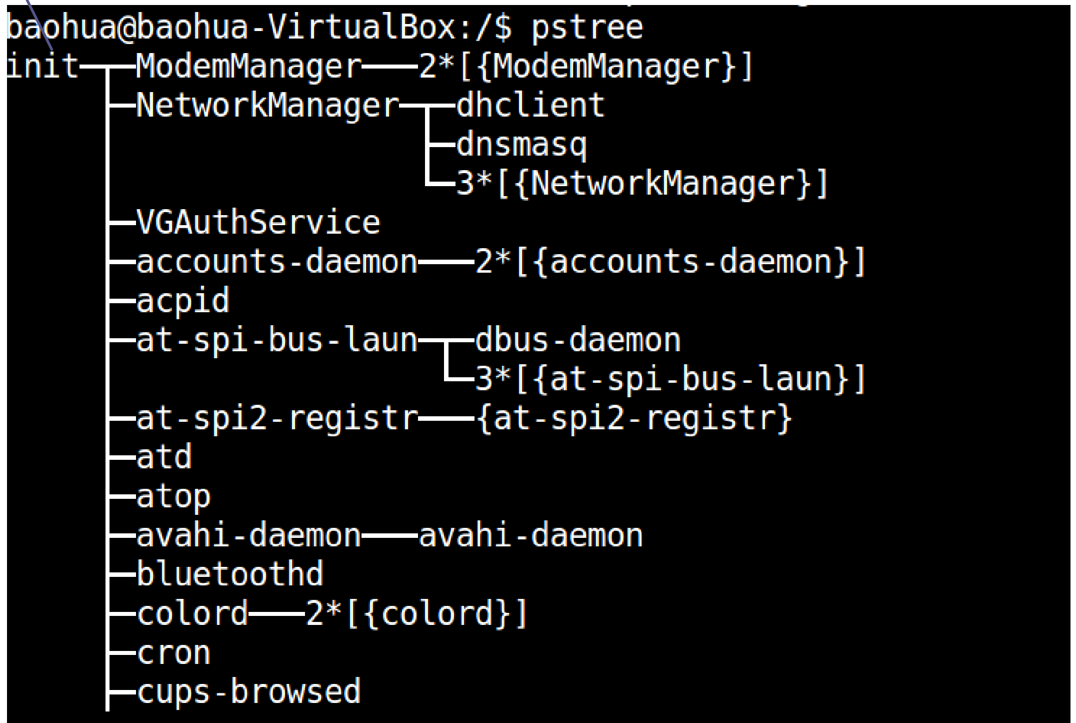
wait queue



```
static ssize_t globalfifo_read(struct file *filp, char __user *buf,
                               size_t count, loff_t *ppos)
{
        int ret;
        struct globalfifo_dev *dev = container_of(filp->private_data,
                struct globalfifo_dev, miscdev);

        DECLARE_WAITQUEUE(wait, current);

        mutex_lock(&dev->mutex);
        add_wait_queue(&dev->r_wait, &wait);

        while (dev->current_len == 0) {
                if (filp->f_flags & O_NONBLOCK) {
                        ret = -EAGAIN;
                        goto out;
                }
                __set_current_state(TASK_INTERRUPTIBLE);
                mutex_unlock(&dev->mutex);

                schedule();
                if (signal_pending(current)) {
                        ret = -ERESTARTSYS;
                        goto out2;
                }

                mutex_lock(&dev->mutex);
        }

        if (count > dev->current_len)
                count = dev->current_len;

        if (copy_to_user(buf, dev->mem, count)) {
                ret = -EFAULT;
                goto out;
        } else {
                memcpy(dev->mem, dev->mem + count, dev->current_len - count);
                dev->current_len -= count;
                printk(KERN_INFO "read %d bytes(s),current_len:%d\n", count,
```

进 程0和1





```
baohua@baohua-VirtualBox:/$ pstree
init─┬─ModemManager───2*[{ModemManager}]
     ├─NetworkManager─┬─dhclient
     │                ├─dnsmasq
     │                └─3*[{NetworkManager}]
     ├─VGAuthService
     ├─accounts-daemon───2*[{accounts-daemon}]
     ├─acpid
     ├─at-spi-bus-laun─┬─dbus-daemon
     │                 └─3*[{at-spi-bus-laun}]
     ├─at-spi2-registr───{at-spi2-registr}
     ├─atd
     ├─atop
     ├─avahi-daemon───avahi-daemon
     ├─bluetoothd
     ├─colord───2*[{colord}]
     ├─cron
     ├─cups-browsed
```

课 程 练 习 源 码

https://github.com/21cnbao/process-courses

谢 谢 !