

1 C1

\$ ifconfig

```
lo0: flags=8049<UP,LOOPBACK,RUNNING,MULTICAST> mtu 16384
    options=1203<RXCSUM, TXCSUM, TXSTATUS, SW_TIMESTAMP>
    inet 127.0.0.1 netmask 0xff000000
    inet6 ::1 prefixlen 128
    inet6 fe80::1%lo0 prefixlen 64 scopeid 0x1
    nd6 options=201<PERFORMNUD,DAD>
gif0: flags=8010<POINTOPOINT,MULTICAST> mtu 1280
stf0: flags=0<> mtu 1280
en0: flags=8863<UP,BROADCAST,SMART,RUNNING,SIMPLEX,MULTICAST> mtu 1500
    options=400<CHANNEL_IO>
    ether 8c:85:90:9f:cf:bc
    inet6 fe80::c86:4dcc:f183:a3a2%en0 prefixlen 64 secured scopeid 0x5
    inet 192.168.1.4 netmask 0xfffff00 broadcast 192.168.1.255
    nd6 options=201<PERFORMNUD,DAD>
    media: autoselect
    status: active
en1: flags=8963<UP,BROADCAST,SMART,RUNNING,PROMISC,SIMPLEX,MULTICAST> mtu 1500
    options=460<TSO4,TSO6,CHANNEL_IO>
    ether 82:40:1d:c1:60:01
    media: autoselect <full-duplex>
    status: inactive
en2: flags=8963<UP,BROADCAST,SMART,RUNNING,PROMISC,SIMPLEX,MULTICAST> mtu 1500
    options=460<TSO4,TSO6,CHANNEL_IO>
    ether 82:40:1d:c1:60:00
    media: autoselect <full-duplex>
    status: inactive
en3: flags=8963<UP,BROADCAST,SMART,RUNNING,PROMISC,SIMPLEX,MULTICAST> mtu 1500
    options=460<TSO4,TSO6,CHANNEL_IO>
    ether 82:40:1d:c1:60:05
    media: autoselect <full-duplex>
    status: inactive
en4: flags=8963<UP,BROADCAST,SMART,RUNNING,PROMISC,SIMPLEX,MULTICAST> mtu 1500
    options=460<TSO4,TSO6,CHANNEL_IO>
    ether 82:40:1d:c1:60:04
    media: autoselect <full-duplex>
    status: inactive
bridge0: flags=8863<UP,BROADCAST,SMART,RUNNING,SIMPLEX,MULTICAST> mtu 1500
    options=63<RXCSUM, TXCSUM, TSO4, TSO6>
    ether 82:40:1d:c1:60:01
    Configuration:
        id 0:0:0:0:0:0 priority 0 hellotime 0 fwddelay 0
        maxage 0 holdcnt 0 proto stp maxaddr 100 timeout 1200
        root id 0:0:0:0:0:0 priority 0 ifcost 0 port 0
        ipfilter disabled flags 0x0
    member: en1 flags=3<LEARNING,DISCOVER>
        ifmaxaddr 0 port 6 priority 0 path cost 0
    member: en2 flags=3<LEARNING,DISCOVER>
        ifmaxaddr 0 port 7 priority 0 path cost 0
    member: en3 flags=3<LEARNING,DISCOVER>
        ifmaxaddr 0 port 8 priority 0 path cost 0
    member: en4 flags=3<LEARNING,DISCOVER>
```

```

        ifmaxaddr 0 port 9 priority 0 path cost 0
nd6 options=201<PERFORMNUD,DAD>
media: <unknown type>
status: inactive
p2p0: flags=8843<UP,BROADCAST,RUNNING,SIMPLEX,MULTICAST> mtu 2304
      options=400<CHANNEL_IO>
      ether 0e:85:90:9f:cf:bc
      media: autoselect
      status: inactive
awdl0: flags=8943<UP,BROADCAST,RUNNING,PROMISC,SIMPLEX,MULTICAST> mtu 1484
      options=400<CHANNEL_IO>
      ether 56:2c:73:6d:fe:92
      inet6 fe80::542c:73ff:fe6d:fe92%awdl0 prefixlen 64 scopeid 0xc
      nd6 options=201<PERFORMNUD,DAD>
      media: autoselect
      status: active
llw0: flags=8863<UP,BROADCAST,SMART,RUNNING,SIMPLEX,MULTICAST> mtu 1500
      options=400<CHANNEL_IO>
      ether 56:2c:73:6d:fe:92
      inet6 fe80::542c:73ff:fe6d:fe92%llw0 prefixlen 64 scopeid 0xd
      nd6 options=201<PERFORMNUD,DAD>
      media: autoselect
      status: active
utun0: flags=8051<UP,POINTOPOINT,RUNNING,MULTICAST> mtu 1380
      inet6 fe80::dece:9040:db5:3732%utun0 prefixlen 64 scopeid 0xe
      nd6 options=201<PERFORMNUD,DAD>
utun1: flags=8051<UP,POINTOPOINT,RUNNING,MULTICAST> mtu 2000
      inet6 fe80::c702:145c:2eb4:e981%utun1 prefixlen 64 scopeid 0xf
      nd6 options=201<PERFORMNUD,DAD>
en5: flags=8863<UP,BROADCAST,SMART,RUNNING,SIMPLEX,MULTICAST> mtu 1500
      ether ac:de:48:00:11:22
      inet6 fe80::aede:48ff:fe00:1122%en5 prefixlen 64 scopeid 0x4
      nd6 options=201<PERFORMNUD,DAD>
      media: autoselect
      status: active

```

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user/myuser.c

```

#include "kernel/types.h"
#include "kernel/stat.h"
#include "user/user.h"

int
main(int argc, char** argv) {

    printf("arg0 is %s\n", argv[0]);
    for (int i = 1; i <= 3; i++) {
        char* tmp = "<empty>";
        if (argc > i) {
            tmp = argv[i];
        }
        printf("arg%d is %s\n", i, tmp);
    }

    exit(0);
}

```

user/sleep.c

```
#include "kernel/types.h"
#include "kernel/stat.h"
#include "user/user.h"

int
main(int argc, char** argv)
{
    if (argc < 2) {
        printf("usage: sleep N_TICKS\n");
        exit(1);
    }

    //No Error
    int num = atoi(argv[1]);
    sleep(num);
    printf("<from user:> Program exiting after sleeping successfully...\n");

    exit(0);
}
```

sys_sleep() in kernel/sysproc.c

```
uint64
sys_sleep(void)
{
    int n;
    uint ticks0;

    if(argint(0, &n) < 0)
        return -1;

    printf("<from kernel:> sleeping for %d ticks\n", n);

    acquire(&tickslock);
    ticks0 = ticks;
    while(ticks - ticks0 < n){
        if(myproc()->killed){
            release(&tickslock);
            return -1;
        }
        sleep(&ticks, &tickslock);
    }
    release(&tickslock);
    return 0;
}
```

3 C3 - Execution Trace of sleep()

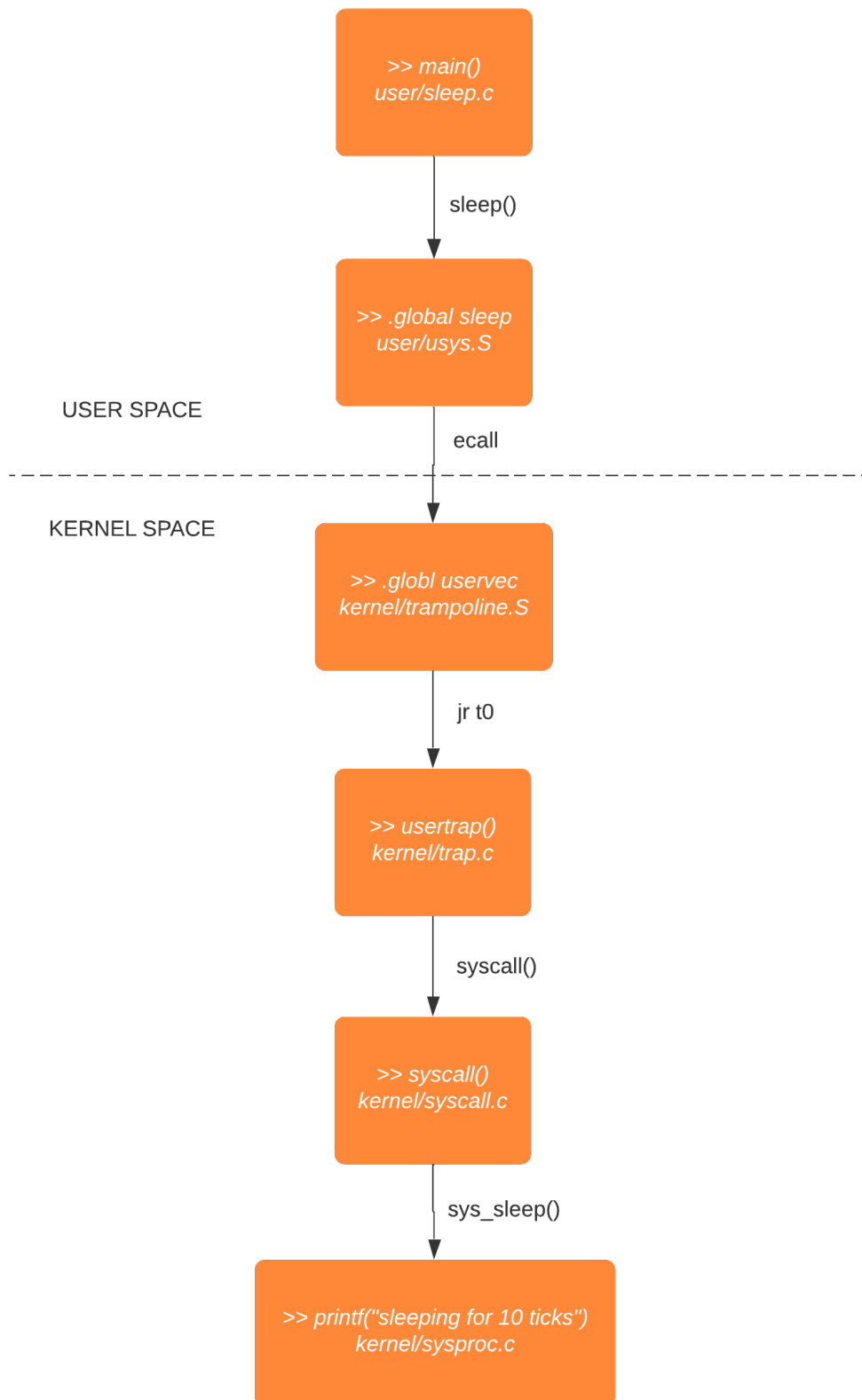


Figure 1: Flowchart depicting execution trace of `sleep()`

4 C3 - Memory Map of xv6 OS on QEMU

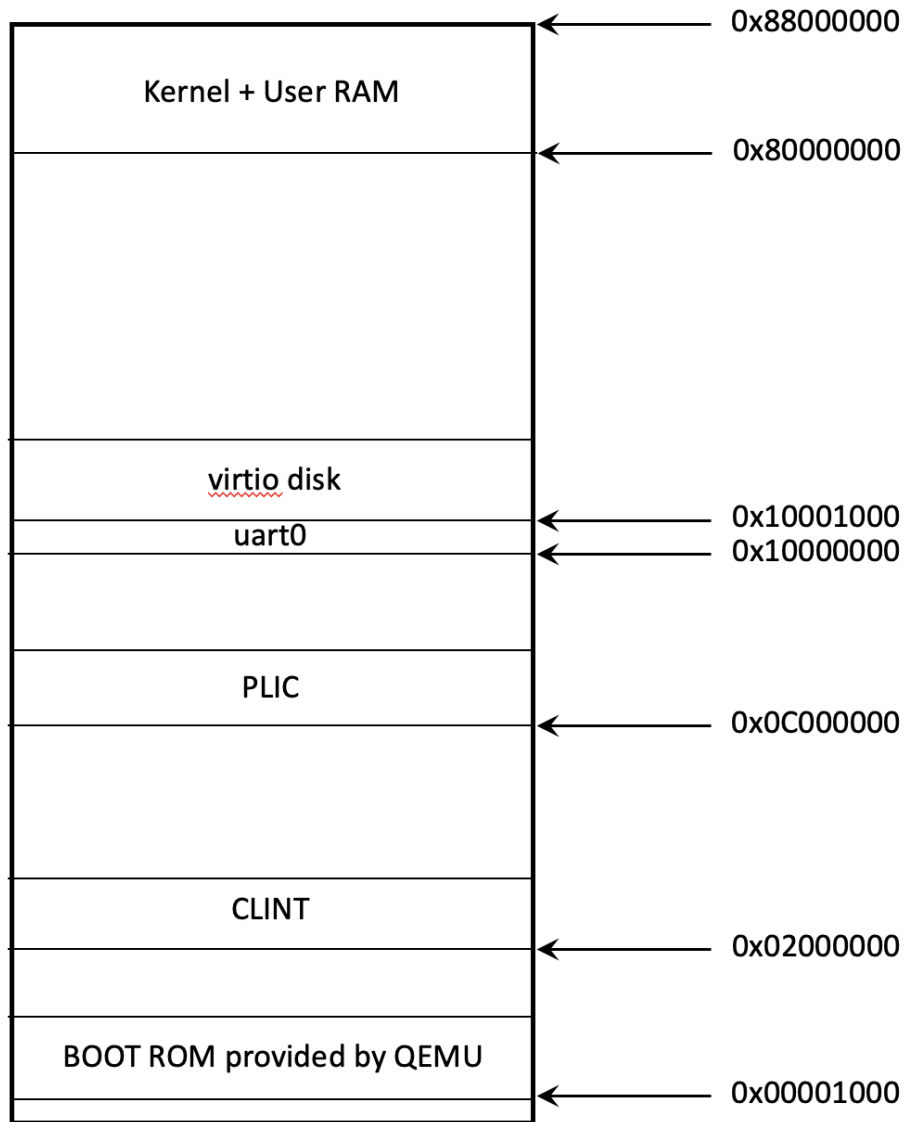


Figure 2: Memory layout of xv6 on QEMU