

# CSL301

## 12340220

### Assignment: Memory Introspection System Calls in xv6

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#### Update **syscall.h**

// Added at the end of syscall numbers

```
#define SYS_numvp 27
#define SYS_numpp 28
#define SYS_getptsize 29
```

---

#### Update **user.h**

// Added at the end of user-level prototypes

```
int numvp(void);
int numpp(void);
int getptsize(void);
```

---

#### Update **usys.S**

// Added at the bottom

```
SYSCALL(numvp)
SYSCALL(numpp)
SYSCALL(getptsize)
```

---

#### Update **sysproc.c**

// Added new system call implementations

```
int sys_numvp(void)
{
    struct proc *p = myproc();
    return (p->sz + PGSIZE - 1) / PGSIZE + 1;
}
```

```

}

int sys_numpp(void)
{
    struct proc *p = myproc();
    pte_t *pte;
    int count = 0;
    for (uint a = 0; a < p->sz; a += PGSIZE)
    {
        pte = walkpgdir(p->pgdir, (void *)a, 0);
        if (pte && (*pte & PTE_P))
            count++;
    }
    return count;
}

int sys_getptsize(void)
{
    struct proc *p = myproc();
    int count = 1; // outer page directory
    for (int i = 0; i < NPENTRIES; i++)
        if (p->pgdir[i] & PTE_P)
            count++;
    return count;
}

```

---

## Update **syscall.c**

```

extern int sys_numvp(void);
extern int sys_numpp(void);
extern int sys_getptsize(void);

```

// Added to syscall dispatch table

```

[SYS_numvp] sys_numvp,
[SYS_numpp] sys_numpp,
[SYS_getptsize] sys_getptsize,

```

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## Create User Program **memtest.c**

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

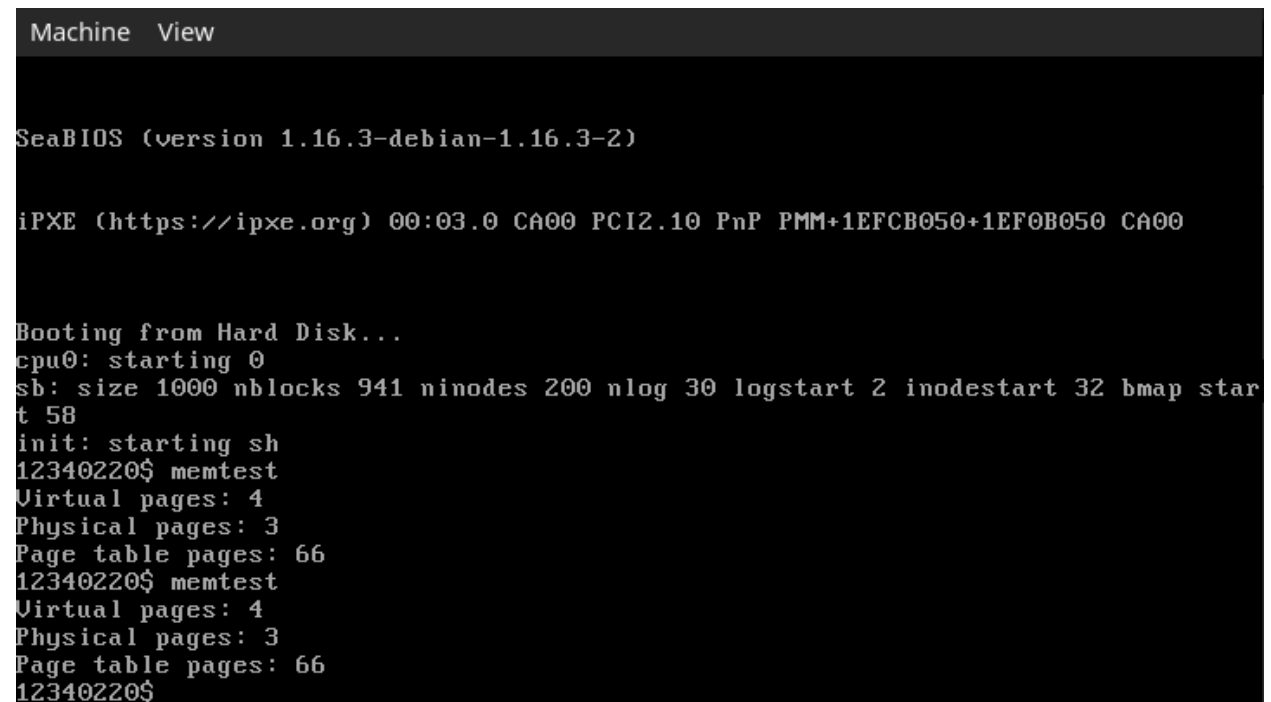
int main(void) {
    printf(1, "Virtual pages: %d\n", numvp());
    printf(1, "Physical pages: %d\n", numpp());
    printf(1, "Page table pages: %d\n", getptsize());
    exit();
}
```

## Update Makefile

# In UPROGS section, add:

```
_memtest\
```

## Screenshot



```
Machine  View

SeaBIOS (version 1.16.3-debian-1.16.3-2)

iPXE (https://ipxe.org) 00:03.0 CA00 PCI2.10 PnP PMM+1EFCB050+1EF0B050 CA00

Booting from Hard Disk...
cpu0: starting 0
sb: size 1000 nblocks 941 ninodes 200 nlog 30 logstart 2 inodestart 32 bmap star
t 58
init: starting sh
12340220$ memtest
Virtual pages: 4
Physical pages: 3
Page table pages: 66
12340220$ memtest
Virtual pages: 4
Physical pages: 3
Page table pages: 66
12340220$
```