

Class Assignment - 4

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- **Step 1 –syscall numbers (`syscall.h`)**

File Name: **`syscall.h`**

Code Added:

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

- **Step 2 – Declare in `user.h`**

File Name: **`user.h`**

Code Added:

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

- **Step 3 : Implement in `sysproc.c`**

File Name: **`sysproc.c`**

Code Added:

```
extern pte_t* walkpgdir(pde_t *pgdir, const void *va, int alloc);  
  
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;
}

```

- **Step 4 : Add to syscall dispatch (`syscall.c`)**

File Name: `syscall.c`

Code Added:

```

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

```

And inside `syscalls[]` table:

```

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

```

- **Step 5 : vm.c**

File Name: vm.c

Code Added:

```
Remove : static pte_t *  
Add : pte_t *
```

- **Step 6 : usys.S**

File Name: usys.S

Code Added:

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

- **Step 7 : Create memtest.c**

File Name: memtest.c

Code Added:

```
#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();  
}
```

- **Step 8 : Makefile**

File Name: Makefile

Code Added:

```
_memtest\
```

OUTPUT :

A terminal window with a dark background and light-colored text. The window title bar is dark and contains the text 'make clean && make && make qemu-nox' along with standard window control icons (search, menu, zoom, and close). The terminal output shows the SeaBIOS boot process, including IPXE initialization, booting from a hard disk, and various system initialization steps like CPU starting, sb initialization, and memory testing. The prompt '12341700\$' is visible at the end of the output.

```
make clean && make && make qemu-nox
SeaBIOS (version 1.16.3-debian-1.16.3-2)

iPXE (https://ipxe.org) 00:03.0 CA00 PCI2.10 PnP PMM+1EFCAF60+1EF0AF60 CA00

Booting from Hard Disk..xv6...
cpu0: starting 0
sb: size 1000 nblocks 941 ninodes 200 nlog 30 logstart 2 inodestart 32 bmap sta8
init: starting sh
12341700$ memtest
Virtual pages: 4
Physical pages: 3
Page table pages: 66
12341700$ 
```