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## myMemory System Call Testing

### Test 1

```
$ test 1
TEST PROCESS
----- MyMemory -----
| ===== kernel =====
| allocated pages: 65540
| writable pages: 65532
|
| ===== user =====
| allocated pages: 3
| writable pages: 3
|-----
```

Tests the base page counts for the test program. Only `myMemory()` is called.

### Test 2

```
$ test 2
adding 4096 bytes to memory...
----- MyMemory -----
| ===== kernel =====
| allocated pages: 65541
| writable pages: 65533
|
| ===== user =====
| allocated pages: 4
| writable pages: 4
|-----
```

Tests the page counter by allocating 4096 bytes (size of a single page). Here (and for all tests) the kernel counters also increment because the kernel can access to the newly allocated pages as well.

### Test 3

```
$ test 3
adding 4097 bytes to memory...
----- MyMemory -----
| ===== kernel =====
| allocated pages: 65542
| writable pages: 65534
|
| ===== user =====
| allocated pages: 5
| writable pages: 5
|-----
```

Tests page counter by allocating 4097 bytes (size of a single page and one extra byte)

### Test 4

```
$ test 4
adding 1024 bytes to memory...
----- MyMemory -----
| ===== kernel =====
| allocated pages: 65541
| writable pages: 65533
|
| ===== user =====
| allocated pages: 4
| writable pages: 4
|-----

adding 1024 bytes to memory...
----- MyMemory -----
| ===== kernel =====
| allocated pages: 65541
| writable pages: 65533
|
| ===== user =====
| allocated pages: 4
| writable pages: 4
|-----
```

Tests page counter by allocating 1024 bytes twice and ensuring only a single page gets allocated.

### Test 5

```
$ test 5
adding 4096 pages to memory...
----- MyMemory -----
| ===== kernel =====
|   allocated pages: 69636
|   writable pages: 69628
|
| ===== user =====
|   allocated pages: 4099
|   writable pages: 4099
| -----
```

Tests page counter by allocating pages in succession and ensuring each allocated page is writable.

### Test 6

```
$ test 6
adding 1048576 pages to memory...
allocuvm out of memory
----- MyMemory -----
| ===== kernel =====
|   allocated pages: 122273
|   writable pages: 122265
|
| ===== user =====
|   allocated pages: 56736
|   writable pages: 56736
| -----
```

Stress tests page counter by allocating pages until no more can be allocated to ensure only actual allocated pages are counted.

### Test 7

```
$ test 7
adding 4096 pages to memory...
----- MyMemory -----
| ===== kernel =====
|   allocated pages: 69636
|   writable pages: 69628
|
| ===== user =====
|   allocated pages: 4099
|   writable pages: 4099
| -----

removing 4096 pages from memory...
----- MyMemory -----
| ===== kernel =====
|   allocated pages: 65540
|   writable pages: 65532
|
| ===== user =====
|   allocated pages: 3
|   writable pages: 3
| -----
```

Tests page counter by allocating pages then deallocating them and ensures the counter accurately decrements.

### Test 8

```
$ test 8
adding and subsequently removing 4096 pages to memory...
----- MyMemory -----
| ===== kernel =====
|   allocated pages: 65540
|   writable pages: 65532
|
| ===== user =====
|   allocated pages: 3
|   writable pages: 3
| -----
```

Tests page counter by allocating and subsequently deallocating pages and ensures no additional pages (often a problem caused by thrashing) get counted.

### Test 9

```
$ test 9
PARENT PROCESS
adding 1 page to memory...
----- MyMemory -----
| ===== kernel =====
| allocated pages: 65541
| writable pages: 65533
|
| ===== user =====
| allocated pages: 4
| writable pages: 4
| -----
forking child process...
CHILD PROCESS
----- MyMemory -----
| ===== kernel =====
| allocated pages: 65541
| writable pages: 65533
|
| ===== user =====
| allocated pages: 4
| writable pages: 4
| -----
```

Tests page counter of a child process (which has a copy of the parent process's page table) and ensures both counts are the same.

### Test 10

```
$ test 10
TEST PROCESS
adding 1 page to memory...
----- MyMemory -----
| ===== kernel =====
| allocated pages: 65541
| writable pages: 65533
|
| ===== user =====
| allocated pages: 4
| writable pages: 4
| -----
exec'ing new process...
TEST PROCESS
----- MyMemory -----
| ===== kernel =====
| allocated pages: 65540
| writable pages: 65532
|
| ===== user =====
| allocated pages: 3
| writable pages: 3
| -----
```

Tests page counter of an exec'ed process (which gets a new page table) and ensures no pages are copied from the original process.

### Test 11

```
$ test 11
SMALL TEST PROCESS
----- MyMemory -----
| ===== kernel =====
| allocated pages: 65539
| writable pages: 65531
|
| ===== user =====
| allocated pages: 2
| writable pages: 2
| -----
```

Tests page counter of different sized program for the text/data pages and sees if those pages get counted accordingly.