COMP3230 Principle of Operating System

Assignment 01 (Due date: 2016/10/13)

UID : 3035124881

Name : Cheng Wei ( BEng (CE) )

Task 3:

1. Given the following piece of code: How many copies of variable c are there at the end of the program ? What are their values ?

Main(int argc, char \*\* argv)

{

int c = 5;

int child = fork();

if( child != 0 )

{

child = fork();

c += 10;

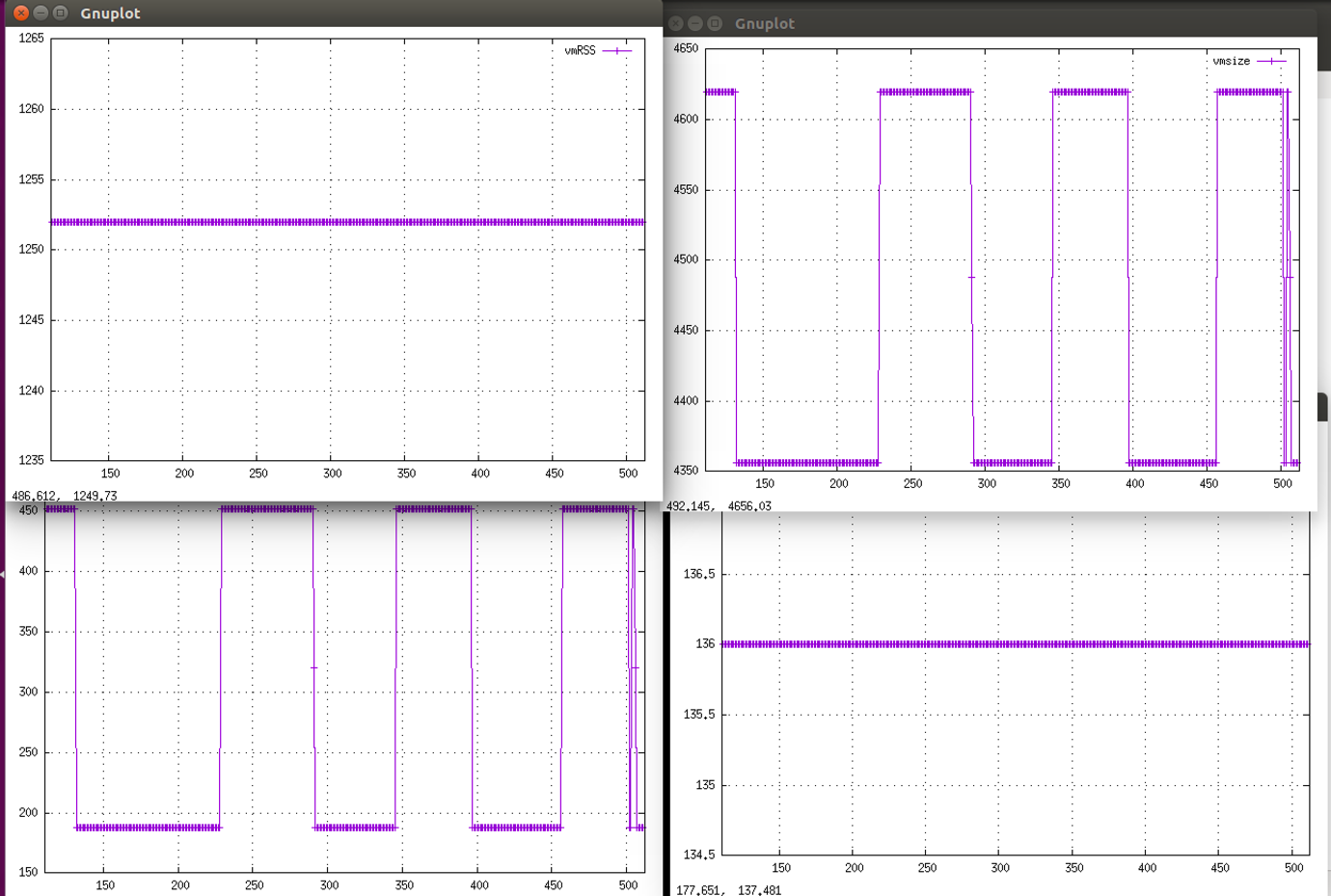
if( child )

c += 5;

}

}

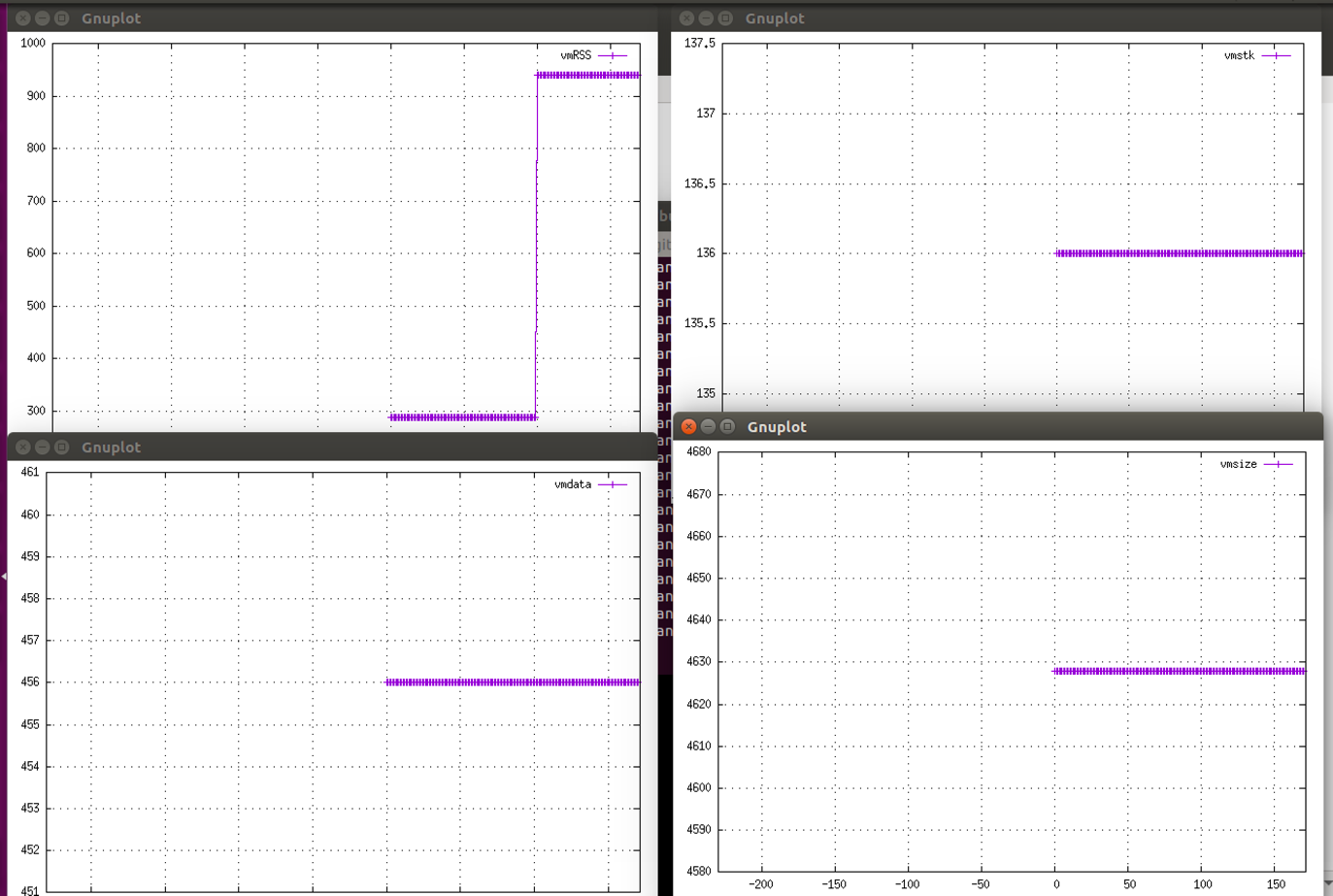
Ans: There are 3 copies of variables at the end of the program with three different kinds of values. There are 5, 10, 15 respectively. 

1. Show the curves of the given program malloc.c. Discuss and explain the patterns of the curves.

Ans:

Vmdata (Virtual Data Segment) and Vmsize (Virtual memory size) usage increases and decreases periodically. Since the malloc.c program asks for additional memory at runtime using function malloc() and releases memory with free() function. Heap size of this process changes at runtime, and since heap belongs to data segment in Process address space, the size of virtual data segment (Vmdata) and memories usage (Vmsize) changes periodically.

While no recursive function calls in malloc.c program, so stack size (Vmstk) remains steady.

1. The pseudo-app null makes modifications to the filename buffer after the sleeping for one second. Why does the VmRSS reading increase while the other 3 readings remain the same ? 

Ans: The rising memory in above chart is caused by Copy On Write. After a fork() system call, which create a new process, a copy of parent's page table is created. After the child process sleeps for 10000000 us, null() function modified data in null\_data character array. Since the child process (created by fork() ) modifies read only data pages (which is shared with parent process initially). A page fault is raised and OS copies that piece of memory from parent process and maps it to child's address space, and also makes it writable. Furthermore, Vmsize only rises once. After COW, new data page for null\_data has already been created, and therefore making any changes to null\_data in child process will not increase total memory.