

# Programming Lab - Memory Management

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In this lab, we will use the “system calls” dealing with memory management. Test the different commands/expressions and write down your comments and what ever you’ve learnt (be concise) in a text document then put it on campus (use your lastnames for the text file).

## 1 Shared Memory

Each process has its own *distinct* context and does not share it with other processes. Memory is part of that context and therefore, if two processes need to share an information in memory, they need to create this bit of space explicitly. In this lab, you’ll be expertimenting with the different system functions used to create such shared space.

Using your usual text editor (vi, emacs, gedit, ...), write this program.

```
#include <stdlib.h>
#include <stdio.h>
#include <string.h>
#include <sys/types.h>
#include <sys/shm.h>
#include <sys/wait.h>

#define KEY 4567
#define PERMS 0660

int main(int argc, char **argv) {
    int id;
    int i;
    int *ptr;

    system("ipcs -m");

    id = shmget(KEY, sizeof(int), IPC_CREAT | PERMS);
    system("ipcs -m");
```

```

ptr = (int *) shmat(id, NULL, 0);

*ptr = 54;
i = 54;

if (fork() == 0) {
    (*ptr)++;
    i++;
    printf("Value of *ptr = %d\nValue of i = %d\n", *ptr, i);
    exit(0);
} else {
    wait(NULL);

    printf("Value of *ptr = %d\nValue of i = %d\n", *ptr, i);

    shmctl(id, IPC_RMID, NULL);
}
}

```

1. What could you infer from the output regarding the state of `i` and `*ptr`?
2. Read the code carefully and add your comments to all the lines
3. Write a program that computes the following expression “ $((a+b)-(c+d))$ ” using a parent and a child process.

## 2 Parallel Computing

Write a program that computes the following expression “ $(a + b) * (c - d) + (e + f)$ ” using 3 different processes.