4. Übung IBN

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Aufgabe 3

The `???` have to be replaced the following way:

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

int main(){

    int i, shmID, *shared_mem, count=0, total=0,rnd;
    shmID = shmgetIPC_PRIVATE, sizeof(int), IPC_CREAT | 0644);
    shared_mem = (int*)shmat(shmID,0,0);
    *shared_mem = 0;
    if (fork())
        for (i=0; i<500; i++){
            *shared_mem+=1;
            printf("\n Elternprozess: %i", *shared_mem);
            sleep(2);
        }
    else
        for (i=0; i<500;i++){
            *shared_mem+=1;
            printf("\n Kindprozess: %i", *shared_mem);
            rnd=rand();
            sleep(rnd%3);
        }
    shmdt(shared_mem);
    shmctl(shmID, IPC_RMID, 0);
    return 0;
}
```

- `shmget` creates a segment of shared memory
- If a process wants to use this segment, it has to attach to it with `shmat`
- Once the process is finished, it detaches from the shared memory with `shmdt`
- `shmctl` performs a specified operation on the shared memory segment

The shared counting doesn't seem to be determinstic. This is because of race conditions concerning the shared variable `shared_mem`

Aufgabe 8

a)

Matrikelnummer	→	Seitennummer (page number)
Wohnadresse	→	Rahmennummer (frame number)
Verzeichnis	→	Seitentabelle (page table)

b) The table would contain entries equal to the number of available matriulation numbers. With 7 digits from 0 to 9, this would make 10^7 entries. This number could be reduced, if one considers the maximum number of students enroled at a single point in time. This way, matriculation numbers could be repurposed if a student is exmatriculated for any reason such as submitting a sample solution for his exercise sheet.

Aufgabe 9

Assuming the counting of addresses starts at 0: (syntax: pagenumber | offset)

$$2456 \mathrel{\hat{=}} 2|408 \quad 16382 \mathrel{\hat{=}} 15|1022 \quad 30000 \mathrel{\hat{=}} 29|304 \quad 4385 \mathrel{\hat{=}} 4|289$$

In C, a calculation could look like this:

```
int page_number = value/pagesize // implicit conversion to int
int offset = value%pagesize
```