TP 08 : Follow up on Signals

1 Baboons and Cheetahs

We can model a predator-prey system with processes. A cheetah can attack a baboon by sending a signal. Reproduction happens with a fork.

We denote the number of baboons with B and the numbers of cheetahs with G. A cheetah attacks a baboon with probability a. A baboon reproduces with probability r_b. After eating a baboon, a cheetah can reproduce with probability r_g. A cheetah dies with probability d.

When a cheetah attacks, it chooses a target. For that, we allocate a shared memory space with `shmem` that contains a array with all the *pids* of the baboons.

Each individual wait a time τ between each action.

1. Which signal can we use to kill the baboons ? Which is the signal mask to take into account ?
2. How can we choose which baboon to kill, assuming that we don't use a shared memory ?
3. Implement this system and find values for r_b, r_g, a, d which lead to an equlibrium (experimentally). Don't forget the existence of `getpid`,`getppid` and the return value of `fork` to get the pids of the various processes.
4. The two species undergoing behavioral evolution, the induvidual seeks the approbation of its partner before reproduction. If its partner agrees (with the same probability), then reproduction happens. Can we still use `sa_sigaction` ? (to simplify, its partner will spawn the child process if it accept.)
5. If a baboon loses one of its chlidren, it can kill one of the cheetahs with probability e. Which signal to use ? Which mask to change ? Do it.
6. The baboons eat the surrounding flora. If there are too many of them, the lack of ressources hinders their development. How to deal with this phenomenon ?

2 Listing

Write a program that lists the content of the current directory, printing the owner, group, permission and type of each file.

3 Shell manipulations

The file *film.csv* contains information about many films in CSV format, with separator ;. Find shell one-liners to answer the following questions :

— Sort movies by popularity
— How many films do not have a directory
— The title of the first 15 films without the principal actor by alphabetic order
— Find the 10 directors that directed the most films, with the number of films
— Find how many films with awards each directors directed

4 Password discovery

A compiled binary is given that prompt for a password. You know that :

— The characters allowed are letters, number, #, $ and %.

— There must be at least one special character.

— The password must have at least 20 characters.

Find the correct password