Operating Systems Programming Lab
Computer Engineering Department
Fall 2023/2024
Lab 04: Signals

Objectives

1. To understand signals and learn how to generate, block, catch, and ignore signals.

Prelab

1. Read the manual pages of the following systems calls:

```
int sigaction(int signum, const struct sigaction *act, struct sigaction *oldact);
int kill(pid_t pid, int sig);
int sigwait(const sigset_t *set, int *sig);
int sigprocmask(int how, const sigset_t *set, sigset_t *oldset);
int sigemptyset(sigset_t *set);
int sigfillset(sigset_t *set);
int sigaddset(sigset_t *set, int signum);
int sigdelset(sigset_t *set, int signum);
int sigismember(const sigset_t *set, int signum);
```

Experiment

1. Modify the `main` function in the program below to make the process catch the SIGINT signal and execute the `handler` function as a handler of this signal.

```
void handler(int signo){
   write(1, "Hello\n", 7);
}

void main(){
   printf("My PID is %d\n", getpid());
   while(1){
      printf("*\n");
   }
}
```

2. In the program below, synchronize the two child processes using the `sigwait` function to always produce the following output:

```
1
A
2
B
3
C
4
D
5
E
```

The code:

```
void main(){
    int i;
    char ch;
    int pid = fork();
    if(pid==0){
       for(i=0;i<5;i++){
          printf("%d\n", i);
       }
    }
    else{
       for(ch='A';ch<'F';ch++){
          printf("%c\n", ch);
       }
    }

}
```

3. Write a program that prints the numbers from 1 to 15 to the screen with a delay of 1 second between every pair of consecutive numbers. Your program should react as follows to signals:
   (a) It ignores SIGUSR1
   (b) It blocks SIGALARM
   (c) It stops printing numbers when receiving a SIGINT signal, and resumes the printing (from the value it stopped at) when receiving another SIGINT signal.
   (d) It restarts the printing from 1 again when it receives a SIGHUP signal.
   (e) SIGINT should be blocked when the program is handling SIGHUP, and also SIGHUP should be blocked while the program is handling SIGINT