ICS EXE 7

April 22, 2020

1 Signal

```c
#include <signal.h>
#include <stdio.h>
#include <stdlib.h>
void handler(int sig) {
    static int beeps = 0;
    printf("BEEP\n");
    if (beeps < 5) {
        beeps += 1;
        fork();
        alarm(1);
    } else{
        printf ("BOOM!\n");
        exit(0);
    }
}

int main() {
    signal(SIGALRM, handler);
    alarm(1);
    while (1);
    exit(0);
}
```

1. How many seconds will this program remain approximately?
2. How many BEEPs and BOOMs will be printed if you run the above program?

2 nonlocal

Implement a version of the standard I/O fgets function, called tfgets, that times out and returns NULL if it does not receive an input line on standard input within 5 seconds. Your function should be implemented in a package called tfgetsproc.c using processes, signals, and nonlocal jumps. It should not use the Linux alarm function. Test your solution using the driver program.

```c
#include "csapp.h"

char *tfgets(char *s, int size, FILE *stream);

int main() {
    char buf[MAXLINE];
    if (tfgets(buf, MAXLINE, stdin) == NULL)
        printf("BOOM!\n");
    else
        printf("%s", buf);
    exit(0);
}
```

3 Signal

```c
volatile sig_atomic_t counter = 0;
void handler(int sig)
{
    int olderrno = errno;
    sigset_t hmask, hprev;
    sigfillset(&hmask);
    while (counter) {
        waitpid(-1, NULL, 0);
        sigprocmask(SIG_BLOCK, &hmask, &hprev);
        sio_putl((long)(--counter));
        sigprocmask(SIG_SETMASK, &hprev, NULL);
        sio_puts("Children running\n");
    }
    errno = olderrno;
}

int main()
{
    Signal(SIGCHLD, handler);
    sigset_t mask, prev;
    sigfillset(&mask);
    for (int i = 0; i < 5; i++) {
        if (fork() == 0) {
            printf("Child\n");
            exit(0);
        }
        sigprocmask(SIG_BLOCK, &mask, &prev);
        counter++;
```

```
29          sigprocmask(SIG_SETMASK, &prev, NULL);
30      }
31      while (counter) pause();
32      exit(0);
33
34  }
```

The given code aims to create 5 children processes and reap them. Try to describe what unexpected problem may happen during execution, and give the solution.

4 File

What is the output of the following program?

```
1  #include <stdio.h>
2  #include <unistd.h>
3  #include <sys/types.h>
4  #include <sys/stat.h>
5  #include <fcntl.h>
6
7  int main(void) {
8      int fd1, fd2, fd3;
9
10     fd1 = open("foo", O_RDONLY |
11                 O_CREAT, S_IRWXU);
12     fd2 = open("foo", O_RDONLY);
13     close(fd1);
14     fd3 = open("foo", O_RDONLY);
15     printf("fd1=%d, fd2=%d, fd3=%d\n",
16            fd1, fd2, fd3);
17     close(fd2);
18     close(fd3);
19
20     return 0;
21 }
```