[HW#3 시스템프로그래밍] pipe 이용한 다중 프로세스 통신

코드 설명

```
#include <stdio.h>
#include <stdlib.h>
#include <unistd.h>
#include <sys/wait.h>
#define BLKSIZE 1000
```

프로그램에 필요한 header file 과 buf에 넣을 BLKSIZE지정

Buf를 0으로 초기화를 하고 값을 더해줄 res또한 0으로 초기화.

pipe(fd)를 미리 선언해두어 사용에 용이하게 설정

```
int main(int argc, char *argv[]){
    pid_t childpid = 0;
    int fd[2];
    int i,n,a,status;
    char buf[BLKSIZE] = { 0, }; //buf 0으로 초기화
    int res = 0;
    n = atoi(argv[2]); //프로세스 개수 n에 저장
    a = atoi(argv[1]); //범위 a에 저장
    pipe(fd);
    for (i = 1; i < n+1; i++){ //자식 프로세스 n개 생성
        if((childpid = fork())== 0){
        break;
        }
    }
```

자식 process 는 범위 내에서 소수를 계산 후 sprint 로 찾은 소수(정수값)을 문자열로 변환 후 write로 pipe 전송을 한다.

```
int k = 0;
if (childpid == 0){
    for(int j = (i-1)*a/n+1; j<i*a/n+1;j++){ //범위 내에서 소수 계산
        if(isPrimeNumber(j) == 1){
        k +=1 ;
        }
    }
    fprintf(stderr, "[%ld] has found %d prime numbers in (%d ~ %d)\n",
        (long)getpid(), k, (i-1)*a/n+1, i*a/n);
    //프로세스 ID와 범위에서 몇개 찾았는지 출력
    sprintf(buf, "%d", k);//소수값 string으로 변환
    write(fd[1], buf, BLKSIZE);//buf로 전송
    return 1; //성공시 1을 리턴
}
```

부모 프로세스는 wait하면서 자식 프로세스가 하나씩 끝날 때 마다 read해서 자식 프로세스가 보내준 내용을 읽고 res에 더해준 후 모든 자식 프로세스가 끝이 나면 더한 res 값을 출력한다.

```
else{
    while (wait(&status) != -1) { //자식이 끝날때 까지 기다린다
        read(fd[0], buf, BLKSIZE); //buf로 수신
        res += atoi(buf);//buf정수로 변환 후 res에 저장
    }
    fprintf(stderr, "[%ld] has found %d prime numbers in (%d ~ %d)\n",
        (long)getpid(), res, 1, a);
}
return 0;
```

소수 범위 (1~10000) 프로세스 1~4개

```
yeonggi@DESKTOP-QK10V32:~/system/hw3$ ./hw3_201713025 10000 1
[67] has found 1229 prime numbers in (1 ~ 10000)
[66] has found 1229 prime numbers in (1 ~ 10000)
yeonggi@DESKTOP-QK10V32:~/system/hw3$ ./hw3_201713025 10000 2
[69] has found 669 prime numbers in (1 ~ 5000)
[70] has found 560 prime numbers in (5001 ~ 10000)
[68] has found 1229 prime numbers in (1 ~ 10000)
yeonggi@DESKTOP-QK10V32:~/system/hw3$ ./hw3_201713025 10000 3
[72] has found 470 prime numbers in (1 ~ 3333)
[73] has found 389 prime numbers in (3334 ~ 6666)
[74] has found 370 prime numbers in (6667 ~ 10000)
[71] has found 1229 prime numbers in (1 ~ 10000)
yeonggi@DESKTOP-QK10V32:~/system/hw3$ ./hw3_201713025 10000 4
[76] has found 367 prime numbers in (1 ~ 2500)
[77] has found 302 prime numbers in (2501 ~ 5000)
[78] has found 281 prime numbers in (5001 ~ 7500)
[79] has found 279 prime numbers in (7501 ~ 10000)
[75] has found 1229 prime numbers in (1 ~ 10000)
```

소수 범위 (1~100000) 프로세스 1~4개

```
yeonggi@DESKTOP-QK10V32:~/system/hw3$ ./hw3_201713025 100000 1
[81] has found 9592 prime numbers in (1 ~ 100000)
[80] has found 9592 prime numbers in (1 ~ 100000)
yeonggi@DESKTOP-QK10V32:~/system/hw3$ ./hw3_201713025 100000 2
[83] has found 5133 prime numbers in (1 ~ 50000)
[84] has found 4459 prime numbers in (50001 ~ 100000)
[82] has found 9592 prime numbers in (1 ~ 100000)
yeonggi@DESKTOP-QK10V32:~/system/hw3$ ./hw3_201713025 100000 3
[86] has found 3569 prime numbers in (1 ~ 33333)
[87] has found 3076 prime numbers in (33334 ~ 66666)
[88] has found 2947 prime numbers in (66667 ~ 100000)
[85] has found 9592 prime numbers in (1 ~ 100000)
yeonggi@DESKTOP-QK10V32:~/system/hw3$ ./hw3_201713025 100000 4
[90] has found 2762 prime numbers in (1 ~ 25000)
[91] has found 2371 prime numbers in (25001 ~ 50000)
[92] has found 2260 prime numbers in (50001 ~ 75000)
[93] has found 2199 prime numbers in (75001 ~ 100000)
[89] has found 9592 prime numbers in (1 ~ 100000)
```

소수 범위 (1~1000000) 프로세스 1~4개

```
yeonggi@DESKTOP-QK10V32:~/system/hw3$ ./hw3_201713025 1000000 1
[95] has found 78498 prime numbers in (1 ~ 1000000)
[94] has found 78498 prime numbers in (1 ~ 1000000)
yeonggi@DESKTOP-QK10V32:~/system/hw3$ ./hw3_201713025 1000000 2
[97] has found 41538 prime numbers in (1 ~ 500000)
[98] has found 36960 prime numbers in (500001 ~ 1000000)
[96] has found 78498 prime numbers in (1 ~ 1000000)
yeonggi@DESKTOP-QK10V32:~/system/hw3$ ./hw3_201713025 1000000 3
[100] has found 28665 prime numbers in (1 ~ 333333)
[101] has found 25404 prime numbers in (333334 ~ 666666)
[102] has found 24429 prime numbers in (666667 ~ 1000000)
[99] has found 78498 prime numbers in (1 ~ 1000000)
yeonggi@DESKTOP-QK10V32:~/system/hw3$ ./hw3_201713025 1000000 4
[104] has found 22044 prime numbers in (1 ~ 250000)
[105] has found 19494 prime numbers in (250001 ~ 500000)
[106] has found 18700 prime numbers in (500001 ~ 750000)
[107] has found 18260 prime numbers in (750001 ~ 1000000)
[103] has found 78498 prime numbers in (1 ~ 1000000)
```