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OPERATING SYSTEM

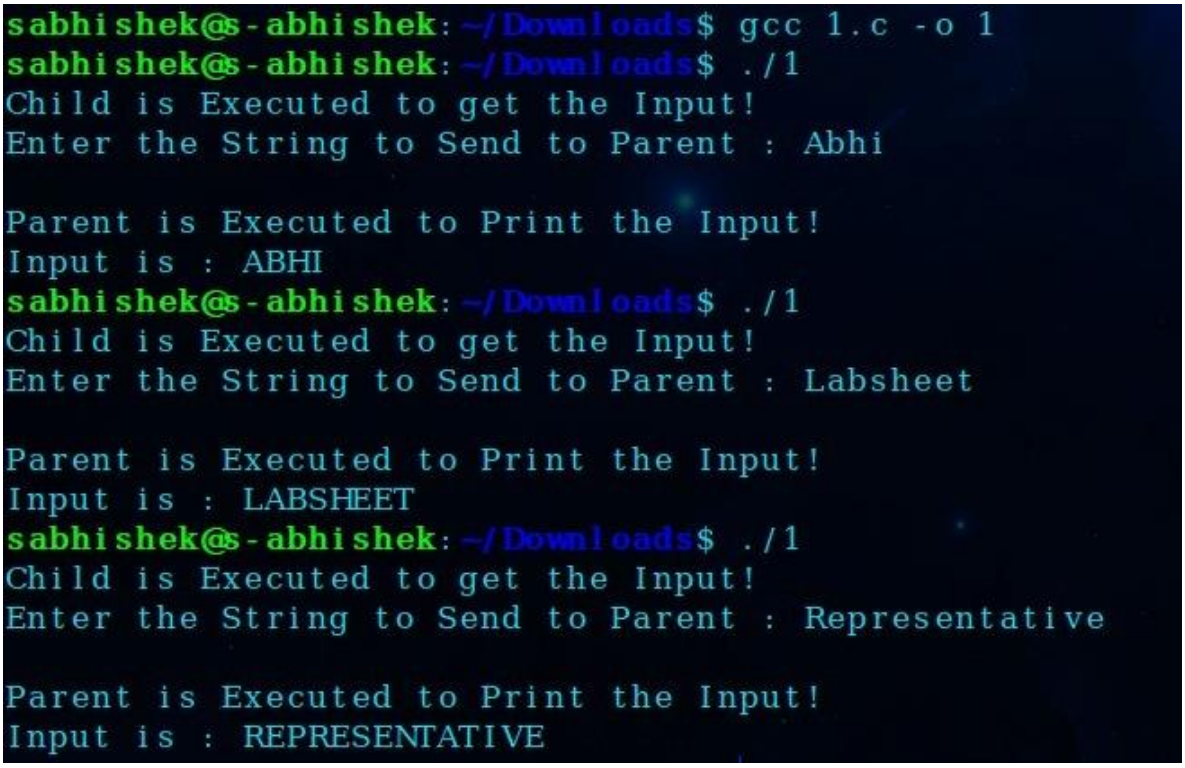
LAB 6 – INTERPROCESS COMMUNICATION USING PIPES

1. Write a C Program that allows communication between parent and child process using ordinary pipes.

The child should take an input (a String) from the user and supply it to the parent and the parent should change it to a string in uppercase and print it there.

```
#include<stdio.h>

#include<unistd.h>

#include<string.h>

#include<sys/wait.h>

int main()

{

    int fd1[2];

    pid_t p;

    if (pipe(fd1)==-1)

    {

        printf("Pipe Failed");
    return 1;
}
p = fork();
if (p < 0)
{
    printf("Fork Failed");
    return 1;
}
 // child process
else if (p == 0)
{
    close(fd1[0]); // Close Read End
    printf("Child is Executed to get the Input!\n");
    printf("Enter the String to Send to Parent : ");
    char input_str[100];
    scanf("%s", input_str);
    write(fd1[1], input_str, strlen(input_str)+1);
    close(fd1[1]); // Close write End
}
// Parent process
else
```

```
    {
        wait(NULL);
        printf("\nParent is Executed to Print the Input!\n");
        close(fd1[1]);  // Close write end of the pipe
        char inp[100];
        read(fd1[0], inp, 100);
        for(int i=0; inp[i]!='\0'; i++)
        {
            if(inp[i]>='a' && inp[i]<='z')
            {
                inp[i] = inp[i] - 32;
            }
        }
        printf("Input is : %s\n", inp);
        close(fd1[0]);
    }
}
```



```
sabhishek@s-abhishek:~/Downloads$ gcc 1.c -o 1
sabhishek@s-abhishek:~/Downloads$ ./1
Child is Executed to get the Input!
Enter the String to Send to Parent : Abhi

Parent is Executed to Print the Input!
Input is : ABHI
sabhishek@s-abhishek:~/Downloads$ ./1
Child is Executed to get the Input!
Enter the String to Send to Parent : Labsheet

Parent is Executed to Print the Input!
Input is : LABSHEET
sabhishek@s-abhishek:~/Downloads$ ./1
Child is Executed to get the Input!
Enter the String to Send to Parent : Representative

Parent is Executed to Print the Input!
Input is : REPRESENTATIVE
```

2. Write a C Program that allows communication between parent and child process using ordinary PIPES.

The parent should keep on taking integers from the user and supplying it to child until a special character is encountered.

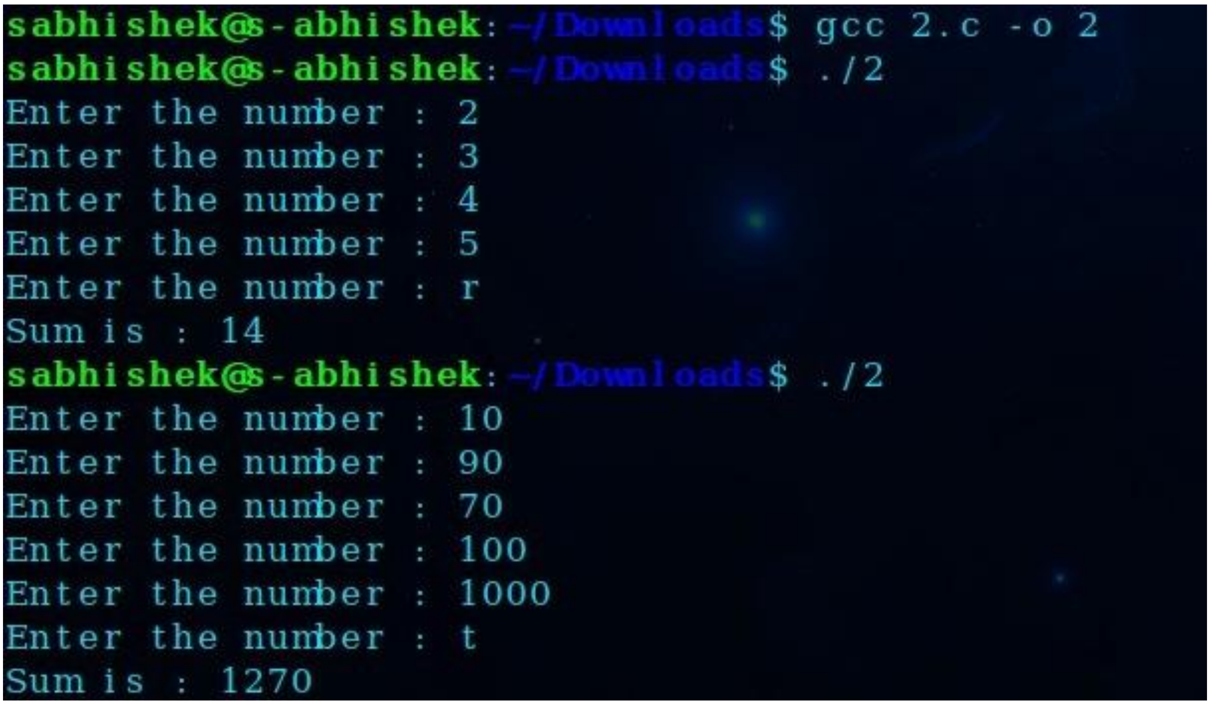
The child should display the sum of these numbers.

```
#include<stdio.h>

#include<string.h>

#include<ctype.h>

#include<unistd.h>

#include<stdlib.h>

#include<sys/wait.h>

int main()
```

```
{
    int fd1[2],inp[100],sum=0,size=0;
    pid_t p;

    if (pipe(fd1)==-1)
    {
        printf("Pipe Failed");
        return 1;
    }

    p = fork();
      if (p < 0)
    {
        printf("Fork Failed");
        return 1;
    }

     // Parent Process
    if (p > 0)
    {
        //printf("\nParent is Executed!\n");
        int arr[100];
        int index = 0;
        while(1)
        {
```

```
char str[10];
int f = 0;
printf("Enter the number : ");

scanf ("%s", str);
int len = strlen (str);
for (int i=0;i<len; i++)
{
    if (!isdigit(str[i]))
    {
        f = 1;
        break;
    }
}

if (f == 1)
{
    close(fd1[0]); // Close Read End
    write(fd1[1], arr,(index)*sizeof(int));
    close(fd1[1]); // Close write End
    break;
}
else
{
    int x = atoi(str);
```

```
                arr[index] = x;
                index++;
            }
        }
    }

    // Child process
    else
    {
        //printf("\nChild is Executed to Print the Input!\n");
        close(fd1[1]);  // Close write end of the pipe
        int s = read(fd1[0], inp,100);
          //printf("%d\n", s);
        s=s/sizeof(int);
          //printf("%d\n", s);
        for(int i=0;i<s;i++)
        {
            sum = sum+inp[i];
              //printf("%d\n", sum);
        }

        printf("Sum is : %d\n", sum);
        close(fd1[0]);
    }
}
```



```
sabhishek@s-abhishek:~/Downloads$ gcc 2.c -o 2
sabhishek@s-abhishek:~/Downloads$ ./2
Enter the number : 2
Enter the number : 3
Enter the number : 4
Enter the number : 5
Enter the number : r
Sum is : 14
sabhishek@s-abhishek:~/Downloads$ ./2
Enter the number : 10
Enter the number : 90
Enter the number : 70
Enter the number : 100
Enter the number : 1000
Enter the number : t
Sum is : 1270
```

3. Write a c program using pipes to find average of square of numbers supplied by a user using 3 processes. 1 parent and two children.

Parent should continuously take integers as input from the user until a special character, square it and supply it to both children.

Child #1 should find sum of these numbers, send it to the parent and exit.

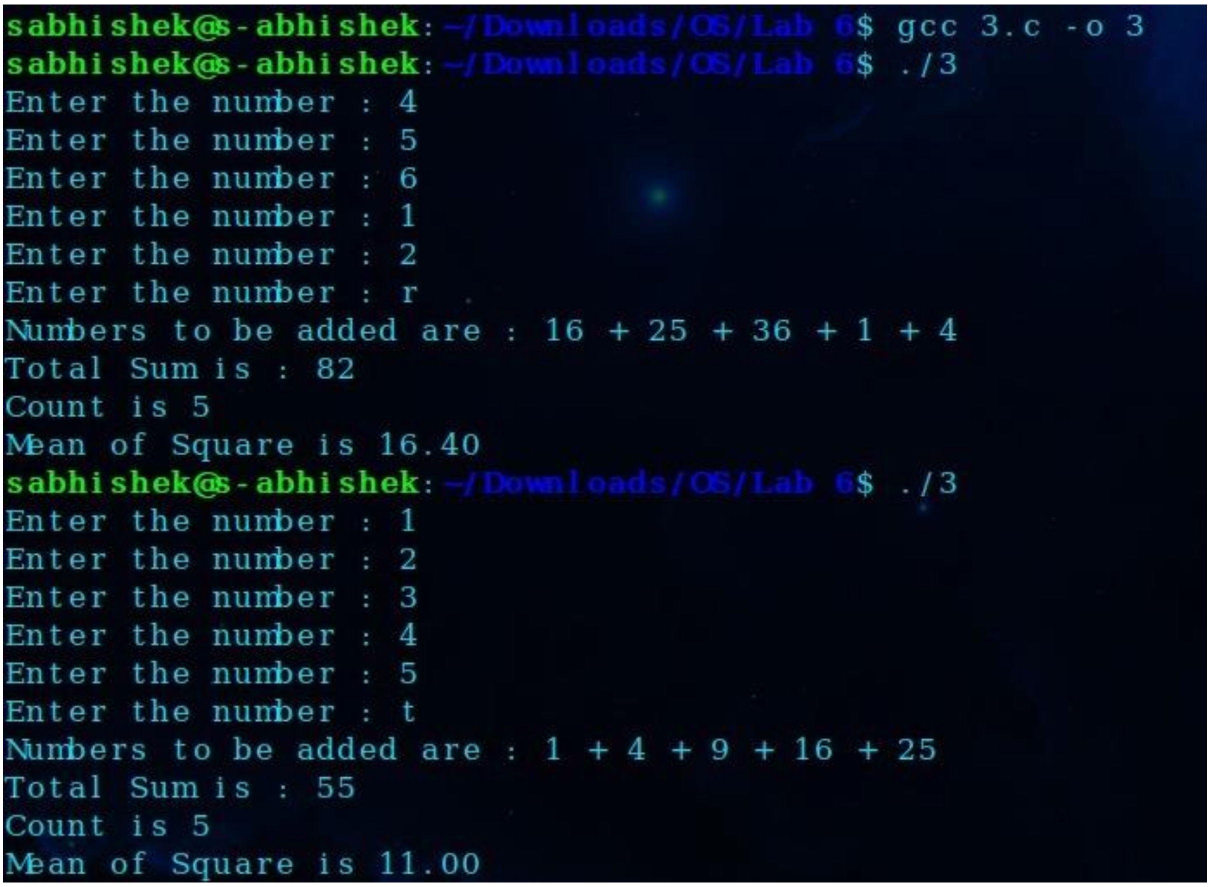
Child #2 should count these numbers, send them to the parent, and exit

Parent on getting response from both the children should find mean of square of numbers supplied by the user by dividing the child #1's result with child 2's and give it to the user.

```
#include<stdio.h>
```

```
#include<unistd.h>

#include<string.h>

#include<ctype.h>

#include<stdlib.h>

#define SIZE 100

int main()

{

    int p1[2],p2[2],c1[2],c2[2],arrw[10],arrr[10],f=0,sum=0,index=0,count=0;

    char str[10];

    pipe(p1),pipe(p2),pipe(c1),pipe(c2);

    if(fork())

    {

        while(1)

        {

            printf("Enter the number : ");

            scanf ("%s", str);

            int len = strlen (str);



            for (int i=0;i<len; i++)

            {

                if (!isdigit(str[i]))

                {

                    f = 1;

                    break;

                }
            }
            if (f == 1)
            {
                write(p1[1],arrw,index*sizeof(int));
                close(p1[1]);
                write(p2[1],arrw,index*sizeof(int));
                close(p2[1]);
                break;
            }

            int x = atoi(str);
            arrw[index] = x*x;
            index++;
        }
        if(fork())
        {
            close(c1[1]);
            read(c1[0],&sum,sizeof(int));
            close(c1[0]);
            close(c2[1]);
            read(c2[0],&count,sizeof(int));
            close(c2[0]);
            printf("\nTotal Sum is : %d\n", sum);
            printf("Count is %d\n",count);
            printf("Mean of Square is %.2f\n",(float)sum/count);
            }

            else

            {

                close(p1[1]);

                count = read(p1[0],arrr,SIZE*sizeof(int));

                close(p1[0]);

                count = count/sizeof(int);

                close(c2[0]);

                write(c2[1],&count,sizeof(int));

                close(c2[1]);

            }

        }

        else

        {

            close(p2[1]);

            index = read(p2[0],arrr,SIZE*sizeof(int));

            close(p2[0]);

            index = index/sizeof(int);

                 printf("Numbers to be added are : ");

            for(int i=0;i<index;i++)

            {

                sum = sum+arrr[i];

                     if (i == index-1)

                     {

                               printf("%d",arrr[i]);
```

```
                }
                else
                {
                        printf("%d + ",arrr[i]);
                }
        }
        close(c1[0]);
        write(c1[1], &sum,sizeof(int));
        close(c1[1]);
    }
}
```



```
sabhishek@s-abhishek:~/Downloads/OS/Lab 6$ gcc 3.c -o 3
sabhishek@s-abhishek:~/Downloads/OS/Lab 6$ ./3
Enter the number : 4
Enter the number : 5
Enter the number : 6
Enter the number : 1
Enter the number : 2
Enter the number : r
Numbers to be added are : 16 + 25 + 36 + 1 + 4
Total Sum is : 82
Count is 5
Mean of Square is 16.40
sabhishek@s-abhishek:~/Downloads/OS/Lab 6$ ./3
Enter the number : 1
Enter the number : 2
Enter the number : 3
Enter the number : 4
Enter the number : 5
Enter the number : t
Numbers to be added are : 1 + 4 + 9 + 16 + 25
Total Sum is : 55
Count is 5
Mean of Square is 11.00
```

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