Operating Systems Lab 5

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Question 1 : Write a producer and consumer program in C using the FIFO queue. The producer should write a set of 4 integers into the FIFO queue and the consumer should display the integers.

Producer.c :

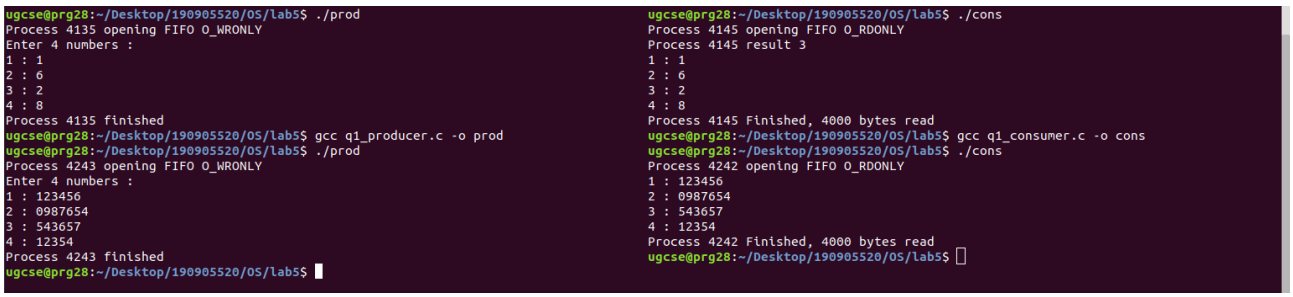
```
#include <unistd.h>
#include <stdio.h>
#include <stdlib.h>
#include <sys/types.h>
#include <limits.h>
#include <fcntl.h>
#include <sys/msg.h>
#include <sys/stat.h>
#include <string.h>

#define FIFO_NAME "my_queue"
#define BUFFER_SIZE 1000

int main(int argn, char* args[]){
     int pipe_fd, res, open_mode = O_WRONLY, n = 0;
     char buffer[BUFFER_SIZE+1];
     if(access(FIFO_NAME, F_OK) == -1){
          res = mkfifo(FIFO_NAME, 0777);
          if(res != 0){
               fprintf(stderr, "Could not create file %s\n",
FIFO_NAME);
               exit(EXIT_FAILURE);
          }
     }
     printf("Process %d opening FIFO O_WRONLY\n", getpid());
     pipe_fd = open(FIFO_NAME, open_mode);
     if(pipe_fd != -1){
          printf("Enter 4 numbers : \n");
          while(n<4){
               printf("%d : ", n+1);
               scanf("%s", buffer);
               res = write(pipe_fd, buffer, BUFFER_SIZE);
               if(res == -1){
                    fprintf(stderr, "Write error on PIPE\n");
                    exit(EXIT_FAILURE);
               }
               n++;
          }
          close(pipe_fd);
     }
     else{
          exit(EXIT_FAILURE);
     }
```

```
     printf("Process %d finished\n", getpid());
     exit(EXIT_SUCCESS);
}
```

Consumer.c :

```
#include <unistd.h>
#include <stdio.h>
#include <stdlib.h>
#include <sys/types.h>
#include <limits.h>
#include <fcntl.h>
#include <sys/msg.h>
#include <sys/stat.h>
#include <string.h>

#define FIFO_NAME "my_queue"
#define BUFFER_SIZE 1000

int main(int argc, char *argv[])
{
    int pipe_fd, res, open_mode=O_RDONLY, n = 0;
    char buffer[BUFFER_SIZE+1];
    memset(buffer,'\0',sizeof(buffer));
    printf("Process %d opening FIFO O_RDONLY\n",getpid());
    pipe_fd = open(FIFO_NAME,open_mode);
    int bytes_read = 0;
    if (pipe_fd!=-1)
    {
        do
        {
            printf("%d : ", n+1);
            res = read(pipe_fd,buffer,BUFFER_SIZE);
            printf("%s\n",buffer);
            bytes_read += BUFFER_SIZE;
            n++;
        }while(n<4);
        close(pipe_fd);
    }
    else
        exit(EXIT_FAILURE);
    printf("Process %d Finished, %d bytes read\n",getpid(),
bytes_read);
    exit(EXIT_SUCCESS);
}
```

Output :

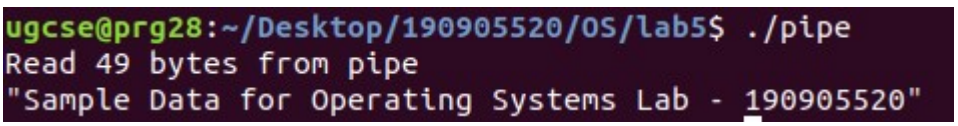


Question 2 : Demonstrate creation, writing to and reading from a pipe.

Source Code :

```
#include <unistd.h>
#include <stdio.h>
#include <stdlib.h>
#include <sys/types.h>
#include <sys/ipc.h>
#include <sys/msg.h>
#include <string.h>

int main(int argc, char *argv[])
{
    int  n, fd[2];
    char buf[1025], *data="Sample Data for Operating Systems Lab - 190905520";
    pipe(fd);
    write(fd[1],data,strlen(data));
    n=read(fd[0],buf,1024);
    if(n>=0)
    {
        buf[n]=0;
        printf("Read %d bytes from pipe\n\"%s\"\n",n,buf);
    }
    else
        perror("Read");
    exit(0);
}
```

Output :



Question 3 : Write a program to implement one side of FIFO.

Program_1.c

```
#include <unistd.h>
#include <stdio.h>
#include <stdlib.h>
#include <sys/types.h>
#include <limits.h>
#include <fcntl.h>
#include <sys/msg.h>
#include <sys/stat.h>
#include <string.h>

#define FIFO_NAME "my_queue"
#define BUFFER_SIZE 10000


int main(int argc, char *argv[])
{
    int pipe_fd, res, open_mode1=O_WRONLY, open_mode2=O_RDONLY,
n=0;

    char buffer[BUFFER_SIZE+1];

    if(access(FIFO_NAME,F_OK)==-1)
    {
        res=mkfifo(FIFO_NAME,0777);

        if(res!=0)
        {
            fprintf(stderr, "Could not create file%s\
n",FIFO_NAME);
            exit(EXIT_FAILURE);
        }
    }

    printf("Creating a program to commuicate with another program
through fifo\n");
    printf("In program 1 right now and will start communicating
with program 2\n");

    while(1)
    {
        pipe_fd=open(FIFO_NAME,open_mode2);

        printf("\nText from program 2:  ");
        res=read(pipe_fd,buffer,BUFFER_SIZE);
        if(strstr(buffer, "exit") != NULL) {
            break;
        }
        printf("%s\n",buffer );
        close(pipe_fd);
```

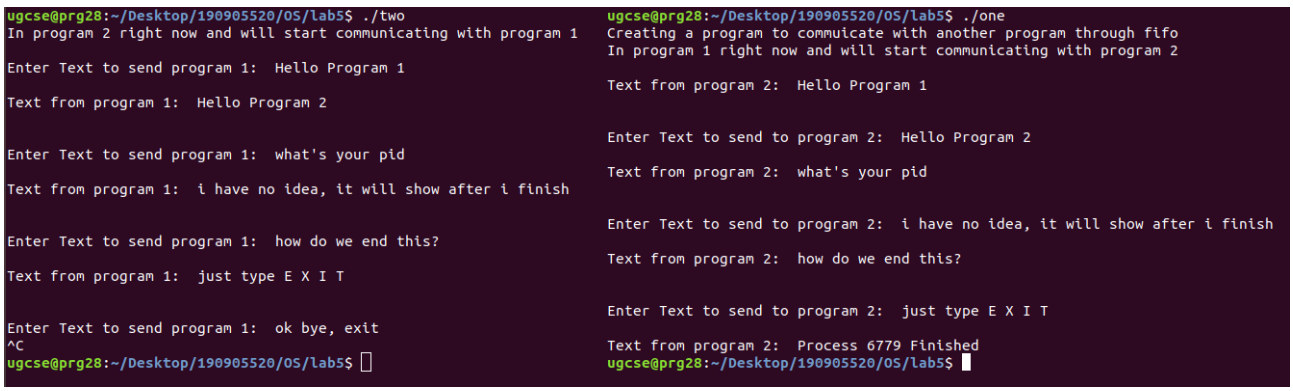
```
        pipe_fd=open(FIFO_NAME,open_mode1);

        printf("\nEnter Text to send to program 2:  ");
        fgets(buffer,BUFFER_SIZE,stdin);
        res=write(pipe_fd,buffer,BUFFER_SIZE);

        close(pipe_fd);


    }

    close(pipe_fd);


    printf("Process %d Finished\n",getpid());
    exit(EXIT_SUCCESS);
}
```

Program_2.c

```
#include <stdio.h>
#include <stdlib.h>
#include <unistd.h>
#include <sys/types.h>
#include <limits.h>
#include <fcntl.h>
#include <sys/msg.h>
#include <sys/stat.h>
#include <string.h>

#define FIFO_NAME "my_queue"
#define BUFFER_SIZE 10000

int main(int argc, char *argv[])
{
    int pipe_fd, res, open_mode1=O_WRONLY, open_mode2=O_RDONLY,
n=0;

    char buffer[BUFFER_SIZE+1];

    if(access(FIFO_NAME,F_OK)==-1)
    {
        res=mkfifo(FIFO_NAME,0777);
        if(res!=0)
        {
            fprintf(stderr, "Could not create file%s\
n",FIFO_NAME );
            exit(EXIT_FAILURE);
        }
    }
        printf("In program 2 right now and will start
communicating with program 1\n");
```

```
    while(1)
    {
        pipe_fd=open(FIFO_NAME,open_mode1);
        printf("\nEnter Text to send program 1:  ");
        fgets(buffer,BUFFER_SIZE,stdin);
        res=write(pipe_fd,buffer,BUFFER_SIZE);

        close(pipe_fd);

        pipe_fd=open(FIFO_NAME,open_mode2);

        printf("\nText from program 1:  ");
        res=read(pipe_fd,buffer,BUFFER_SIZE);
        if(strstr(buffer, "exit") != NULL) {
            break;
        }
        printf("%s\n",buffer );
        close(pipe_fd);

    }
    close(pipe_fd);


    printf("Process %d Finished\n",getpid() );
    exit(EXIT_SUCCESS);
}
```

Output :



Question 4 : Write a program reading and writing binary files in C.

Source Code :

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

int main()
{

    FILE* fout;
    int num=0;
    fout=fopen("my_binary_file.bin","wb+");

    printf("Enter 4 numbers of your choice: \n");

    for(int i=0;i<4;i++)
    {

        scanf("%d",&num);
        fwrite(&num,sizeof(int),1,fout);
    }

    printf("Writing done!\n");
    fclose(fout);

    printf("Reading the binary file now\n");

    fout=fopen("my_binary_file.bin","rb");

    for(int i=0;i<4;i++)
    {

        fread(&num,sizeof(int),1,fout);
        printf("%d\n",num);
    }
    fclose(fout);
}
```

Output :