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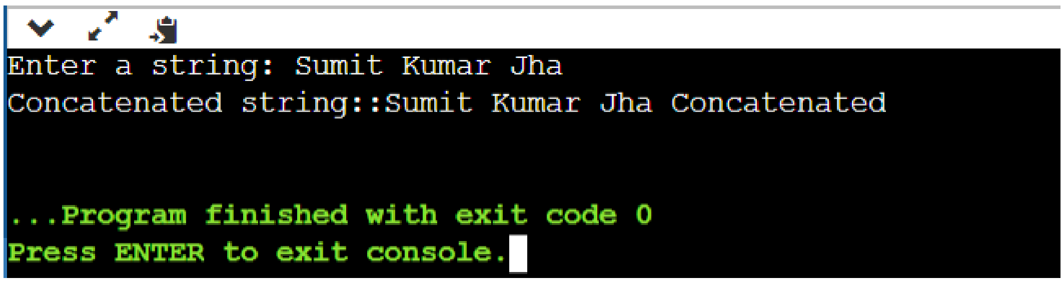
Motilal Nehru National Institute of Technology Allahabad Prayagraj
Distributed System (CS17201)
B.Tech (CSE) – VII Sem Lab 1

1. Write a program to create two processes. First process takes a string and passes it to the second process through a pipe. The second process concatenates the received string with another string without using string function and sends it back to the first process for printing.
Code :

```c
#include <stdio.h>
#include <stdlib.h>
#include <string.h>
#include <unistd.h>

#define BUFFER_SIZE 100

int main()
{
    int pipe_fd[2];
    char input_string[BUFFER_SIZE];
    char received_string[BUFFER_SIZE];

    if (pipe(pipe_fd) == -1)
    {
        perror("pipe");
        exit(EXIT_FAILURE);
    }

    pid_t pid = fork();
    if (pid == -1)
    {
        perror("fork");
        exit(EXIT_FAILURE);
    }

    if (pid == 0)
    {
        close(pipe_fd[1]);
        ssize_t bytes_read = read(pipe_fd[0], received_string, BUFFER_SIZE);
        if (bytes_read == -1)
        {
            perror("read");
            exit(EXIT_FAILURE);
        }

        close(pipe_fd[0]);

        strcat(received_string, " Concatenated");
        printf("Concatenated string::%s\n", received_string);
        exit(EXIT_SUCCESS);
    }
    else
    {
        close(pipe_fd[0]);
        printf("Enter a string: ");
        fgets(input_string, BUFFER_SIZE, stdin);
        input_string[strcspn(input_string, "\n")] = '\0';

        ssize_t bytes_written = write(pipe_fd[1], input_string,
strlen(input_string));

        if (bytes_written == -1){
            perror("write");
            exit(EXIT_FAILURE);
        }

        close(pipe_fd[1]);
        // for child process to terminate
        wait(NULL);
    }

    return 0;
}
```



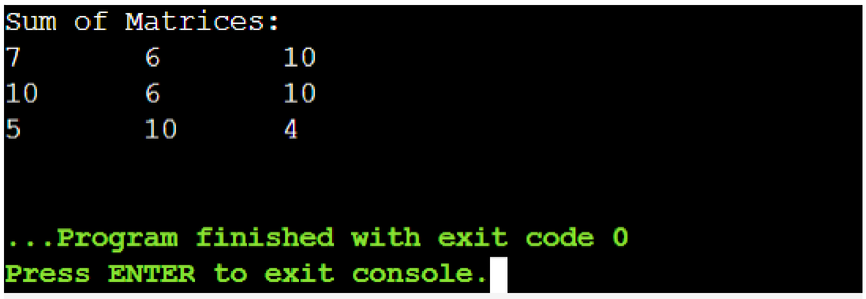
```
Enter a string: Sumit Kumar Jha
Concatenated string::Sumit Kumar Jha Concatenated


...Program finished with exit code 0
Press ENTER to exit console.
```

The codes are done online due to linux unavailability on the local system

2. Develop a program in which the parent process sends two matrices to its child process through a pipe and the child process returns the sum of the matrices to the parent through a pipe. The parent should print the result.
Code :

```c
#include <stdio.h>
#include <stdlib.h>
#include <unistd.h>
#define ROWS 3
#define COLS 3

void sendMatrix(int pipe_fd[2], int matrix[ROWS][COLS])
{
    close(pipe_fd[0]);
    write(pipe_fd[1], matrix, sizeof(int) * ROWS * COLS);
    close(pipe_fd[1]);
}

void receiveMatrix(int pipe_fd[2], int result[ROWS][COLS])
{
    close(pipe_fd[1]);
    read(pipe_fd[0], result, sizeof(int) * ROWS * COLS);
    close(pipe_fd[0]);
}

int main()
{
    int matrix1[ROWS][COLS] = {{3, 2, 3}, {4, 1, 6}, {2, 8, 3}};
    int matrix2[ROWS][COLS] = {{4, 4, 7}, {6, 5, 4}, {3, 2, 1}};
    int result[ROWS][COLS] = {0};

    int pipe_parent_to_child[2];
    int pipe_child_to_parent[2];

    if (pipe(pipe_parent_to_child) == -1 || pipe(pipe_child_to_parent) == -1){
        perror("pipe");
        exit(EXIT_FAILURE);
    }

    pid_t pid = fork();
    if (pid == -1){
        perror("fork");
        exit(EXIT_FAILURE);
    }
    if (pid == 0){
        int child_result[ROWS][COLS] = {0};

        receiveMatrix(pipe_parent_to_child, matrix1);
        receiveMatrix(pipe_parent_to_child, matrix2);

        for (int i = 0; i < ROWS; i++){
            for (int j = 0; j < COLS; j++){
                child_result[i][j] = matrix1[i][j] + matrix2[i][j];
            }
        }

        sendMatrix(pipe_child_to_parent, child_result);
        exit(EXIT_SUCCESS);
    }
    else{
        sendMatrix(pipe_parent_to_child, matrix1);
        sendMatrix(pipe_parent_to_child, matrix2);

        receiveMatrix(pipe_child_to_parent, result);

        printf("Sum of Matrices:\n");
        for (int i = 0; i < ROWS; i++){
            for (int j = 0; j < COLS; j++){
                printf("%d\t", result[i][j]);
            }
            printf("\n");
        }
    }

    return 0;
}
```

Output :



```
Sum of Matrices:
7       6       10
10      6       10
5       10      4


...Program finished with exit code 0
Press ENTER to exit console.
```

The codes are done online due to linux unavailability on the local system