

Name: T. Nikhil Kumar Reddy

Reg-No: 192372024

9. Illustrate the concept of inter-process communication using shared memory with a C program.

Aim

To demonstrate inter-process communication (IPC) using shared memory in C, where one process writes data to a shared memory segment, and another process reads it.

Algorithm

1. Create a shared memory segment using `shmget`.
2. Attach the shared memory segment to the address space of the process using `shmat`.
3. In one process:
 - Write data to the shared memory segment.
4. In another process:
 - Attach to the same shared memory.
 - Read the data from the shared memory segment.
5. Detach and delete the shared memory segment using `shmdt` and `shmctl`.

Procedure

1. Use `fork()` to create a parent and child process.
2. Parent writes data to the shared memory segment.
3. Child reads the data from the same shared memory segment.
4. Detach and clean up the shared memory after communication.

Code:

```

#include <stdio.h>
#include <sys/ipc.h>
#include <sys/shm.h>
#include <sys/types.h>
#include <unistd.h>
#include <string.h>
#include <sys/wait.h>

#define SHM_SIZE 1024

int main() {
    key_t key = ftok("shmfile", 65);
    int shmid = shmget(key, SHM_SIZE, 0666 | IPC_CREAT);
    if (shmid == -1) {
        perror("shmget failed");
        return 1;
    }

    char *shared_memory = (char *)shmat(shmid, NULL, 0);
    if (shared_memory == (char *)-1) {
        perror("shmat failed");
        return 1;
    }

    pid_t pid = fork();

    if (pid == 0) {
        sleep(1);
        printf("Child read: %s\n", shared_memory);
        shmdt(shared_memory);
    } else {
        strcpy(shared_memory, "Hello from parent!");
        wait(NULL);
        shmctl(shmid, IPC_RMID, NULL);
    }

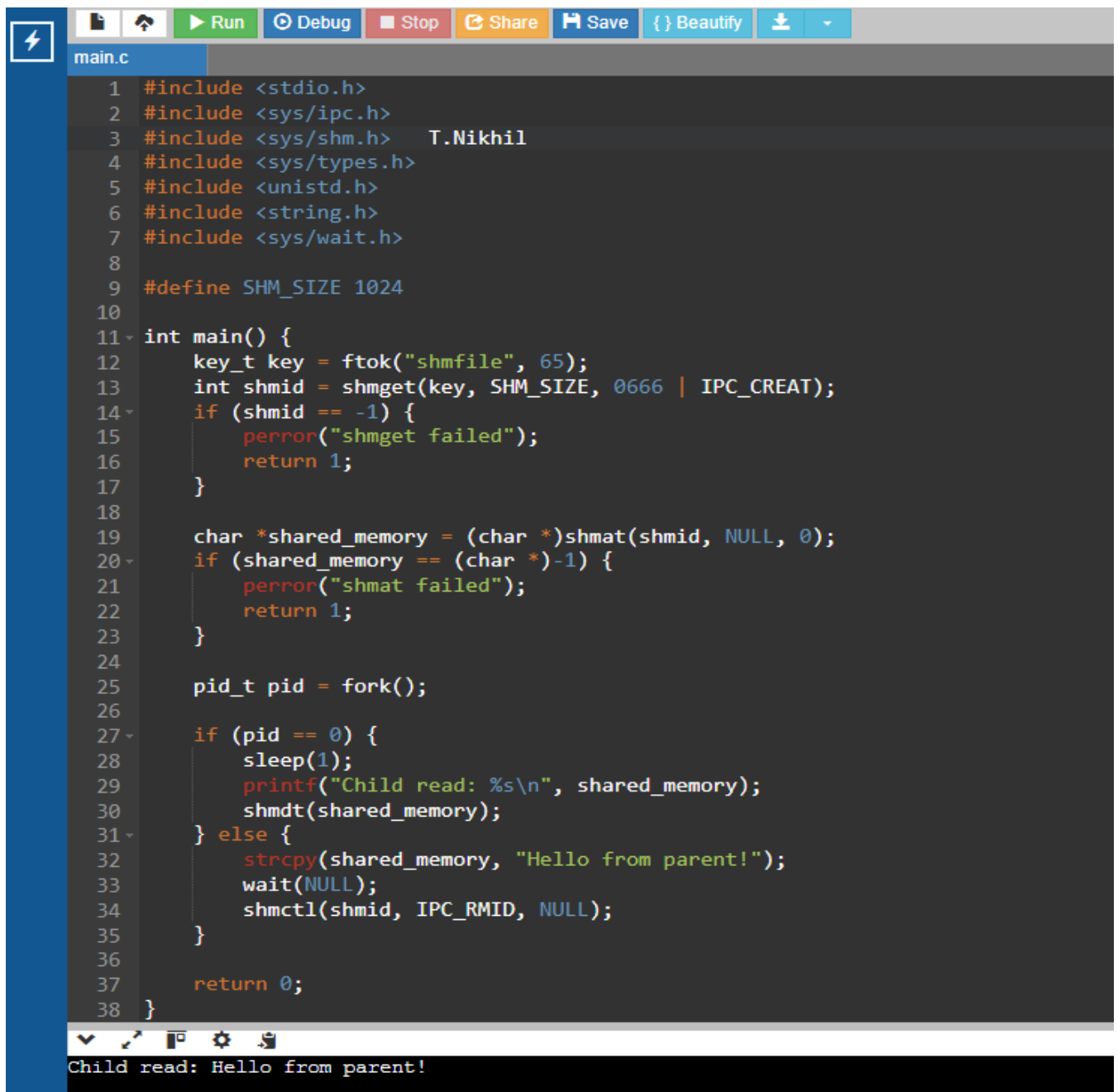
    return 0;
}

```

Result

- **Parent Process** writes the message "Hello from parent!" to the shared memory.
- **Child Process** reads the message from the shared memory and prints:
Child read: Hello from parent!

Output:



The image shows a code editor window with a toolbar at the top containing icons for Run, Debug, Stop, Share, Save, Beautify, and a dropdown menu. The file name 'main.c' is displayed in the editor's title bar. The code is written in C and implements a shared memory communication between a parent and child process. The parent process (PID 0) writes 'Hello from parent!' to a shared memory segment. The child process (PID 1) reads the message from the shared memory and prints 'Child read: Hello from parent!'. The code includes standard headers for file I/O, system calls, shared memory, types, unistd, string, and wait. It defines a shared memory size of 1024 bytes. The main function uses `ftok`, `shmget`, `shmat`, `fork`, `sleep`, `printf`, `shmctl`, `wait`, and `shmctl` to manage the shared memory and process synchronization. The output of the program is displayed in a terminal window at the bottom of the editor.

```
1 #include <stdio.h>
2 #include <sys/ipc.h>
3 #include <sys/shm.h> T.Nikhil
4 #include <sys/types.h>
5 #include <unistd.h>
6 #include <string.h>
7 #include <sys/wait.h>
8
9 #define SHM_SIZE 1024
10
11 int main() {
12     key_t key = ftok("shmfile", 65);
13     int shmid = shmget(key, SHM_SIZE, 0666 | IPC_CREAT);
14     if (shmid == -1) {
15         perror("shmget failed");
16         return 1;
17     }
18
19     char *shared_memory = (char *)shmat(shmid, NULL, 0);
20     if (shared_memory == (char *)-1) {
21         perror("shmat failed");
22         return 1;
23     }
24
25     pid_t pid = fork();
26
27     if (pid == 0) {
28         sleep(1);
29         printf("Child read: %s\n", shared_memory);
30         shmctl(shared_memory);
31     } else {
32         strcpy(shared_memory, "Hello from parent!");
33         wait(NULL);
34         shmctl(shmid, IPC_RMID, NULL);
35     }
36
37     return 0;
38 }
```

Child read: Hello from parent!