EXPERIMENT : 9

README

Aim :

Implement the Readers-Writers problem (using processes along with pipes and message queue).

Contents :

1. readers_writers.c

Instructions :

1. gcc must be installed on the system.
2. Running the program (tested on ubuntu) :
   - gcc readers_writers.c
   - ./a.out
3. Provide required no of readers and writers as input
4. Program executes according to the constraints
5. Run the program multiple times. Answers will be different each time.
6. NB : If the program gives wrong output, try clearing the message queue using the command line and re-run the program.

Explanation :

1. The program creates a separate child process for each reader and writer.
2. Each reader or writer process is subject to some constraints :
   - Only one writer may write at a time
   - Multiple readers can read at a time
   - If a writer is writing, no other writer/reader can read
   - If at least one reader is reading, no other writer can write
   - Readers cannot write and can only read.
3. This program makes use of a message queue for message passing.
4. A count stored inside messages is used for synchronization.
5. A resource count is also stored inside the message, which is read by the readers and modified by the writers.
6. A little bit of randomness is also added to the creation of processes which gives us a different output each time the program is run.

Screenshots :

Result 1 :

```
ben@ben:~/Programming/C/NP Lab/9$ ./a.out

No of Readers : 5
No of Writers : 3

Creating required processes..

A writer has gained access
Writer 1 modified resource to : 2

A writer has gained access
Writer 2 modified resource to : 3

A writer has gained access
Writer 3 modified resource to : 4

Readers have gained access
Reader 4 read resource as : 4
Reader 5 read resource as : 4
Reader 2 read resource as : 4
Reader 1 read resource as : 4

Readers have gained access
Reader 3 read resource as : 4
```

Result 2 :

```
ben@ben:~/Programming/C/NP Lab/9$ ./a.out

No of Readers : 5
No of Writers : 3

Creating required processes..

Readers have gained access
Reader 1 read resource as : 1

A writer has gained access
Writer 3 modified resource to : 2

Readers have gained access
Reader 2 read resource as : 2

A writer has gained access
Writer 1 modified resource to : 3

Readers have gained access
Reader 5 read resource as : 3
Reader 4 read resource as : 3
Reader 3 read resource as : 3

A writer has gained access
Writer 2 modified resource to : 4
```

Result 3 :

```
ben@ben:~/Programming/C/NP Lab/9$ ./a.out

No of Readers : 5
No of Writers : 3

Creating required processes..

Readers have gained access
Reader 1 read resource as : 1

A writer has gained access
Writer 2 modified resource to : 2

A writer has gained access
Writer 1 modified resource to : 3

Readers have gained access
Reader 4 read resource as : 3
Reader 5 read resource as : 3
Reader 2 read resource as : 3
Reader 3 read resource as : 3

A writer has gained access
Writer 3 modified resource to : 4
```