Q.NO.1

Inter Process Communication (IPC) using Message Queues:

Header files used:

#include<stdio.h> most commonly used header file in every C program

#include<stdlib.h> which is used for process control and memory allocation

#include<sys/ipc.h> which is used for messages and shared memory. Here for some of the functions like key_t this is used

#include<sys/msg.h> which is the header file containing many system calls for message like mkfifo, msgsnd, msgrcv etc,.

#include<sys/stat.h> is the C Posix library that contains constructs that provide information about file attributes

#include<unistd.h> is the used for POSIX operating system API for function definitions like fork() system calls.

Files:

Course_Instructor.c

Student.c

Teaching_Assistant.c

- *Course_Instructor.c* takes input marks of the student and share the marks with *Students.c* and *Teaching_Assistant.c*
- *Student.c* outputs the marks of each student
- *Teaching_Assistant.c* reads all the student marks, Calculate average and assign grades as per the grading criteria and sends the average and each individual student grade to the *Course_Instructor.c*

Commands:

gcc -o Course_Instructor Course_Instructor.c

./Course_Instructor

gcc -o Student Student.c

./Student

gcc -o Teaching_Assistant Teaching_Assistant.c

./Teaching_Assistant

Q.NO.2

Bankers Algorithm:

Header files used:

#include<stdio.h> most commonly used header file in every C program

#include<stdlib.h> which is used for process control and memory allocation

#include<stdbool.h> which supports Boolean data type i.e. the data type which returns true or false or 1 or 0.

Input Format:

n -> Number of Processes

m -> Number of Resources

n x m -> Alloc Table

n x m -> Max Table

m -> Total Table

n -> Process_sequence

Requesting Process

Request Array

Subproblems:

- Firstly checks if Safe sequence is possible for given input. If it is possible then prints that sequence else prints No safe sequence.
- Then check if given process sequence is a safe sequence and print accordingly
- Then Checks if the request array can be granted and print accordingly.

Files:

Banker_algo.c

in1.txt

in2.txt

in3.txt

Here 3 input files are to used to show different possible instances.

Commands to run:

gcc -o Banker_algo Banker_algo.c

./Banker_algo < in1.txt

./Banker_algo < in2.txt

./Banker_algo < in3.txt

Q.No.3

Dining Philosopher Problem using Semaphore

Header files used:

#include<pthread.h> contains various thread functionalities which are used while implementing Dining Philosopher problem

#include<semaphore.h> contains sem_t type used in performing semaphore operations and also sem_wait, sem_post, sem_init etc., semaphore related functionalities.

#include<stdio.h> most commonly used library in every C program

#include<unistd.h> is the used for POSIX operating system API for function definitions like fork() system calls.

Files:

Dining_Algorithm.c

Commands to run:

gcc -o Dining_Algorithm Dining_Algorithm.c -pthread

./Dining_Algorithm