BIRLA INSTITUTE OF TECHNOLOGY & SCIENCE PILANI, K. K. BIRLA GOA CAMPUS, II SEMESTER 2022-2023

Operating Systems (CS F372)

Component: Online #2, Weightage: 8% [24 Marks]

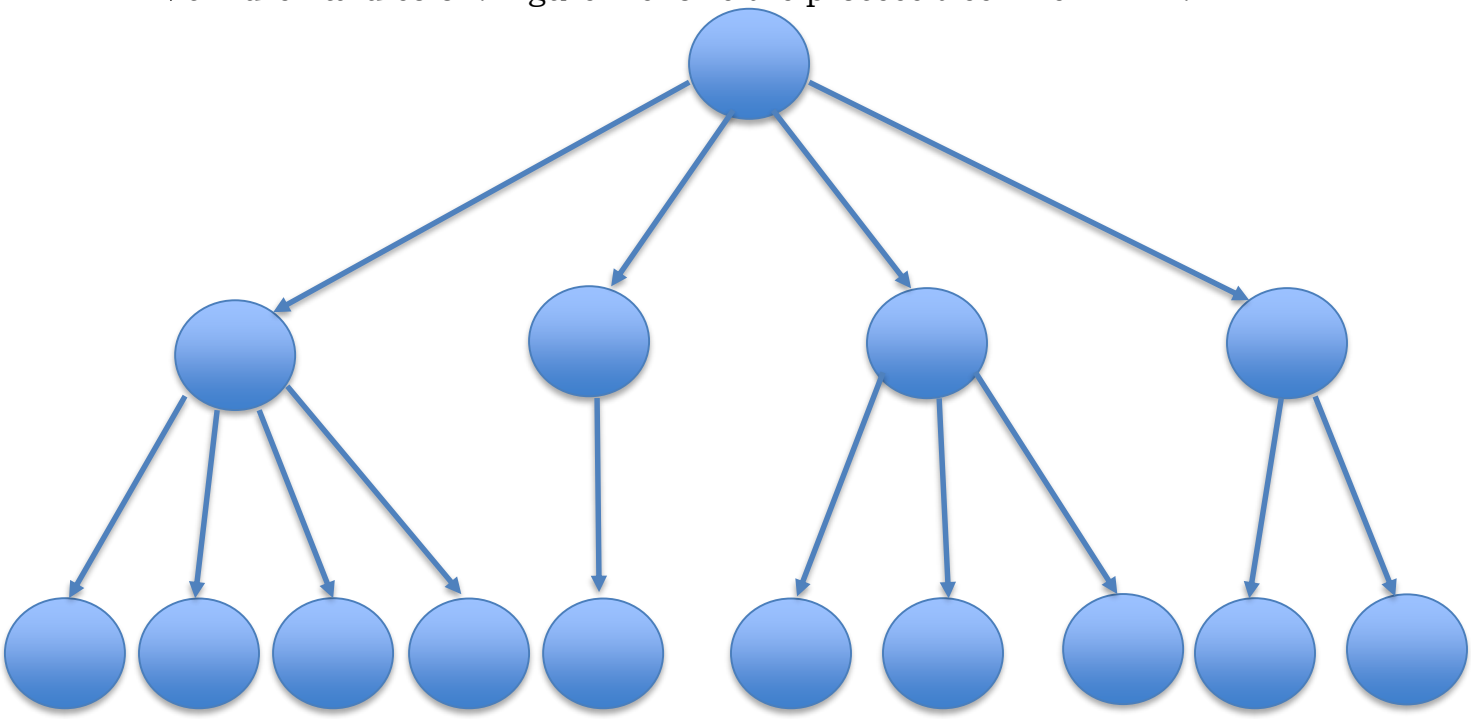
Date: 07/03/2023, Time: 8:00 P.M to 9:30 P.M

Question: Create a given process Tree and communicate with Shared Memory and Signals

Implement the following using C program in your implementation file.

The function createProcessTree takes an integer number N as argument. The function checks whether N is between 3 and 6. It returns -1 if N is less than 3 and returns -2 if N is greater than 6. The function does the following for correct N values.

You need to create a 2 level process tree. In first level, the number of processes will be equal to N. In next level first process will create N children, next process will create 1 child, next process will create N-1 children, next process will create 2 children and so on. Figure 1 shows the process tree when N = 4.



For each parent, all the child processes should be created as quickly as possible before any child starts its executing. After creating all the child processes of a parent, parent should create a shared memory and attach it with all the child processes and should update all the child PIDs in it. The parent will give signal

to the first odd PID child process to start its execution. After the odd child process finishes its execution it [the child process] gives signal to the next odd child process [if there exist an odd child process; otherwise to the smallest PID even child process]. This continues until all the children finish their execution.
Create a file with online2_<IDNO>.c as name and write the code in it. Use the given header file and driver file [you are not expected to do any modification in these files].

To compile and create your executable do the following:
gcc –c online2_<IDNO>.c
gcc –o <executable name> driver.c online2_<IDNO>.o
./<executable name>