**5th Semester - UE18CS305 – Introduction to Operating Systems Laboratory**

**Date: 26/08/2020**

**Instructions to Students**

* **OS Lab sessions will be conducted online until further notice. A Lab instruction manual will be sent to the students every week. It will contain the program/experiment details, preparation notes/concepts and relevant steps to conduct the experiment along with the results expected. Students need to prepare well before working on the experiments.**
* **Students will execute the programs from home and do the submissions as per the requirement (via edmodo) on or before the due date.**
* **Edmodo Class Code will be shared with the individual section shortly.**
* **Students should contact their respective lab faculty (for now it’s just me** [**venkateshprasad@pes.edu**](mailto:venkateshprasad@pes.edu)**) for queries on the instructions and lab conduction via Edmodo or email.**
* **All the experiments are Linux based using C programming requiring students to work in the User space only (See Page 3). If the current situation improves and we are in a position to conduct physical/live lab sessions, we may include XV6 OS based experiments for the students to work in the Kernel space for which we will conduct a training session on XV6.**
* **Students need to use their personal laptop with Linux installed on it to conduct these experiments. It is the responsibility of the students using Windows or MacOS to get Linux OS installed on top of the existing OS or get access to a Linux system.**

* **Students, initially, need to save their programs on their local drives. At the end of every lab or based on the due date provided on Edmodo for each experiment, students need to upload the deliverables in a Word format to Edmodo. Where ever applicable, screen shots of the results should be copied into a Word file and then uploaded.**
* **If the lab program solutions are shared with other students, their marks are also shared. No full marks. In some cases, Zero marks will be given. Plagiarism will be checked on every submission.**

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* **As part of lab evaluation, regular viva will be conducted by the lab faculty to check the weekly submissions made by every student. During the evaluation, you are required to show the execution of the programs, program code and answer viva questions. The respective lab faculty will inform the dates for these regular Vivas. These regular Vivas will be conducted in addition to ISA1 and ISA2 Viva.**
* **Submission of the lab programs on or before the due date carries full marks. Late submissions will attract 10% penalty for every week of delay.**

**IOS Lab Evaluation Policy for 100 Marks**

1. **ISA (Internal Scheme Assessment)** **60 Marks**

* **Submission: 10 Marks (Program Code, Write-up/Type-up on problems encountered, method or approach used to fix the problem, program output, results and any other observation ALL IN WORD FORMAT)**
* **Conduction & Modification: 30 Marks (Program execution with proper solution, output & justification with screenshots for proof of conduction)**
* **Viva: 20 Marks (Regular (approx. once in 3 weeks) Viva each carrying 10 Marks will be conducted in addition to ISA1 and ISA2 viva)**

1. **ESA (External Scheme Assessment)** **40 Marks**

* **Conduction: 20 Marks (Mode of conduction will be intimated later. Modification to the lab programs or similar problems need to be executed)**
* **Quiz: 20 Marks (CBT mode of conduction on the concepts covered in the lab)**

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**LIST OF PROGRAMS PLANNED**

1. **Execute and familiarize with Linux environment & commands, Makefile and Make utility**
2. **Familiarize with Shell Scripting.**
3. **Write a C program to understand the use of fork() in process creation.** 
   1. **Expand the program for 3 consecutive fork() calls? Print some messages and develop reasoning for the received outputs.**
   2. **Repeat with 4 consecutive fork() calls.**
   3. **Write a C program to demonstrate the use of exec() and wait(). Use one of the family of exec system calls – execl().**

**Additional Programs for Practice and bonus marks:**

1. **Write a C program that uses the child to compute partial sums and parent to compute the partial products of an array of integers.**
2. **Write a C program in which process P1 creates process P2 and P2 creates process P3.**
3. **The Fibonacci sequence is the series of numbers 0, 1, 1, 2, 3, 5, 8, ... Write a C program using the fork() system call that generates the Fibonacci sequence in the child process. The number of the sequence will be provided in the command line. For example, if 5 is provided, the first five numbers in the Fibonacci sequence will be output by the child process.**
4. **Write a C program to implement Shortest-Job-First scheduling algorithm.**
   1. **Write a C program to implement Priority Scheduling algorithm.**
5. **Write a C program to implement Round Robin scheduling algorithm.**
   1. **Test your program with small and large quantum values wrt CPU burst time.**
6. **Write a C program to implement race condition in Producer –Consumer problem**
7. **Write a C program to implement Producer Consumer problem using Mutex (create producer and consumer threads)**
8. **Write a C program to implement classic inter process communication problem (Producer Consumer) using Semaphores.**
9. **Implement Producer-Consumer Problem using Pipes.**
10. **Write a C program to implement the solution to Dining-Philosophers problem.**
11. **Write a C program to implement paging using Best-fit and Worst-fit algorithms.**
12. **Write a C program to implement Least Recently Used page replacement algorithm.**
    1. **Write a C program to implement optimal page replacement algorithm.**
13. **Write a C program to implement FCFS/SCAN/C-SCAN disk scheduling algorithms.**

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