

# CS232 Operating Systems

## Assignment 03: Concurrency and Synchronization

Due: 16th November, 2020.

CS Program

Habib University

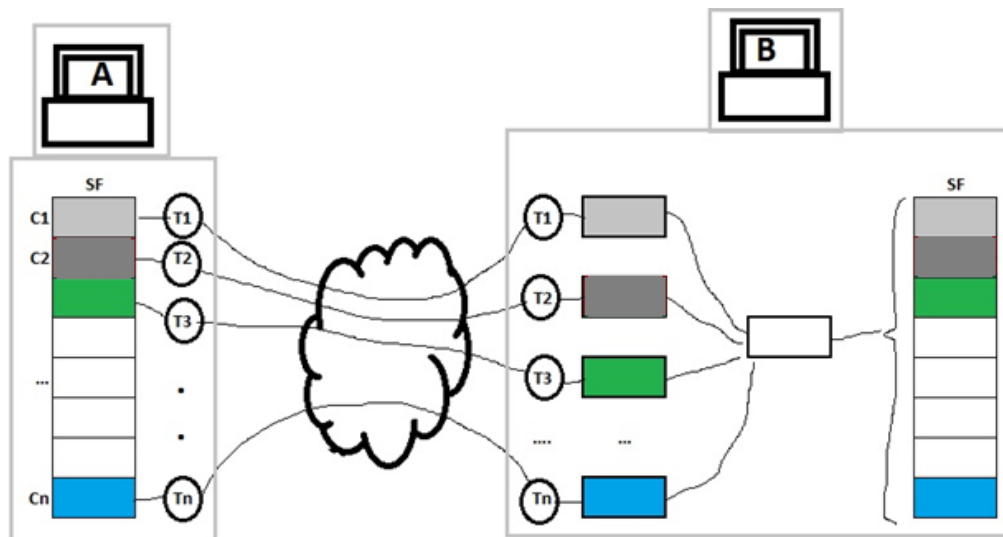
Fall 2021

### 1. Objectives

- a) Practice mutual exclusion and synchronization in parallel multi-threaded code.
- b) Practice Socket programming.
- c) Practice Standard file I/O programming.

### 2. Description

You have to develop a client/server or peer-to-peer application for file transfer from one process to another process. the application must support multithreading for concurrent file transfer. You also have to design a protocol to perform communication among each process/component. the simple scenario is given below in the self-explanatory diagram.



### Working Scenario:

- 1. There are two processes running on different computers (can also be run on same computer)
- 2. A running as background server process/component to listen requests for file transfer

3. B requests A to transfer file “SF” in “n” concurrent sessions.
4. Process A opens the file in ‘N’ threads and transfer all parts through concurrent sessions to B.
5. After receiving all parts, B needs to merge part-files into a single final file SF.

### 3. Program Requirements:

**Inputs:** 1. Source File name, 2. Number of concurrent sessions

**Processing:** Concurrent/parallel file transfer as explain in the diagram.

**Output:** Single file at the destination.

**Test cases:** Transfer and check files at the destination for correctness.

- File types: text, image and large compressed & video files
- Number of threads: 1, 5, 10 etc.

### 4. Rubric

The goal is to fulfill all requirements described above, but we want you to get there step by step.

#### 4.1 Submission

You will submit:

1. your program code files for multithreaded sender and receiver as .c files
2. your design document containing protocols and algorithms to implement the parallel/concurrent file transfer as PDF, MSWord file.
3. Program correctness/results for test cases given below  
Transfer and check files at the destination for correctness.  
File types: text, image and large compressed & video files  
Number of threads: 1, 5, 10 etc.
4. A single PDF containing your design document and all codes and the results of test cases.

#### 4.2 Marks

- 20 marks for designing the protocol for parallel/concurrent file transfer.
- 70 marks in total, each test case carry equal marks approximately 5.8.

Transfer and check files at the destination for correctness.

File types: text, image, large compressed and video files

Number of threads: 1, 5, 10.

- 10 points for final documentation file.

### **4.3 Penalties**

1. Code doesn't compile (-100 marks)
2. Code has warnings (-20 marks). Compile your code with -Wall flag.
3. Code has memory leaks (-20 marks), in case you used dynamic memory.
4. Submission not correct, i.e., missing PDF, messed up program output, etc. (-20 marks)
5. Late submission: -20 marks + -10\*num days

Marks obtained: = max (0, marks + penalties).