CS546 "Parallel and Distributed Processing"
Fall 2019 – Homework 5 (I/O lectures)

Submission:
This is an INDIVIDUAL written assignment.
Due by 11:59pm of 11/12/2019
Total points 100 - Late penalty: 10% penalty for each day late
Please upload your assignment on Blackboard with the following name:
CS546_SectionNumber_LastName_FirstName_HW_IO.
Please do NOT email your assignment to the instructor and/or TA!

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1. **(5 points)** Provide definitions for: a) file, b) file metadata, c) file operations, and d) file attributes.
2. **(5 points)** What is a file system and what are its main components?
3. **(5 points)** Are the `open` and `close` system calls strictly necessary? How would a system work without them?
4. **(10 points)** Provide an overview of PFS. Briefly discuss its design goals, its strengths and weaknesses.
5. **(10 points)** Compare the file-per-process and shared-file access patterns. Pros and cons.
6. **(10 points)** Describe how data distribution works in PFS.
7. **(10 points)** Locking in PFS. Discuss and list some of the challenges.
8. **(10 points)** What is Layered Performance Matching (LPM) method? What is the advantage of the LPM method? Why LPM can improve memory performance (in terms of memory stall time) by more than one hundred times?
9. **(10 points)** What is Pace-Matching Data Transfer? Can we achieve Pace-Matching Data Transfer?
10. **(10 points)** Assume: CycleCPU = 2 ns, Cyclemem = 8 ns, fmem = 20%, IPCexe = 2.5, APC = 1; please calculate the LPM Ratio (LPMR).
11. **(15 points)** Give two non-locality-based methods which can reduce C-AMAT. Please explain why your methods works.

Note: We encourage collaboration between you and your classmates. Discuss various approaches and techniques to better understand the questions. However, we do NOT allow copying solutions or code. This is considered as cheating and falls under IIT code of honor. Penalties will be enforced. Please make sure you write your own solutions.
GOOD LUCK!