National University of Computer and Emerging Sciences

Laboratory Manual # 09
Operating Systems

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Section	BCS-4E
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Instructions:

- Submit a world/LibreOffice file containing screenshots of terminal commands/ Output
- Submit your .c (Code files)
- In case of any explanation you can add a multiline comment.

Objectives:

- Memory mapping

Learning Material:

- Memory mapping
- mmap manual
- Extend or shrink existing memory (mremap)
- Memory mapping, translate logical address to physical address

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1. Exercise: [10]

Create a file named "data.txt" in the same directory as your program. Populate this file with some text content (e.g., "Hello, Memory Mapping!").
Write a C program that performs the following tasks:

- Open the "data.txt" file for reading and writing.
- Uses the mmap system call to map the contents of "data.txt" into memory.
- Displays the content of the mapped memory region on the console.
- Modifies the content of the mapped memory region to append " - Updated!" to the existing text.
- Displays the updated content of the mapped memory region on the console.
- Unmaps the memory region and closes the file.

2. Exercise: [10]

Write C/C++ code for a program that takes as command line argument a file name. Your program will make a memory map of the file and replace all integers with spaces. Make two threads for this purpose. The first thread will replace integers with spaces from the first half of the map and the second thread will replace integers with spaces from the second half of the map. Assume that there are 100 bytes in the file. (Hint: Create a single map. Pass the map pointer to the first thread as a parameter. For the second thread, add 50 to the map pointer and pass it to the second thread as a parameter, i.e., map+50.

Sample Data for File:

v1gU6OTgN7DMifG7zmQWp04ZEyGmRifq1uFsS9RzZWcCQL7jBMNKUQVEAIsKZia40M3TqJeGEMEkkSagfUc7mU3PbQ1zsiJm23Hq