University of Colombo School of Computing
IS 1114 - Data Structures and Algorithms I

Lab Sheet 06 – 09th Jan 2024

File Handling

File Reading and Writing

1. Write a C program that reads data from a file named "input.txt" containing integers and writes the even numbers to a new file named "even_numbers.txt" and odd numbers to a file named "odd_numbers.txt". Display the content of both files after writing.

Random Access and Modification

2. Create a program that demonstrates random access to a file named "data.bin". Allow the user to modify a specific block (say 512 bytes) of data at a given offset in the file. Display the content of the file before and after the modification.

Block-by-Block Accessing

3. Develop a C program that reads a text file named "text.txt" block by block (128 bytes) and displays each block's content on the console.

Circular Queue Implementation

Circular Queue Basics

4. Implement a circular queue using arrays to store integers. Provide functions for enqueue, dequeue, and display operations. Test the functionalities by performing enqueue and dequeue operations on the queue and display the resulting queue after each operation.

Queue Operations

5. Extend the circular queue implementation to handle character data type. Implement functions to enqueue characters, dequeue characters, and display the resulting queue. Demonstrate these operations by enqueuing a string "HELLO" and dequeuing two characters consecutively.

Circular Queue Error Handling

6. Enhance the circular queue implementation to handle queue full and queue empty situations. Modify enqueue and dequeue functions to handle these cases gracefully. Demonstrate these cases by attempting to enqueue elements into a full queue and dequeue elements from an empty queue.

File Modifications and Circular Queue Integration

Circular Queue Data Storage

7. Develop a C program that reads integers from a file named "numbers.txt" and stores them in a circular queue. Implement functions to read from the file and enqueue the integers into the circular queue. Display the contents of the queue after enqueuing.

File Update using Queue Data

8. Write a program that dequeues integers from the circular queue created in the previous question and updates a file named "updated_numbers.txt" with these integers. Display the content of the updated file.

Queue Empty Check

9. Modify the program in question 7 to include an empty check before dequeuing elements from the circular queue. Handle the case when the queue is empty and display an appropriate message.

File Integrity Check

10. Create a program that reads data from "updated_numbers.txt" and checks if the data matches the content of the circular queue used in question 7. Display a message indicating whether the file data matches the queue content or not.