Circular Doubly Linked List

**Node Class:**

The **Node** class remains the same as before, with pointers for both the next and previous nodes.

**CircularDoublyLinkedList Class:**

Constructor **CircularDoublyLinkedList()**

* Initializes an empty circular doubly linked list with **head**, **tail**, and **length**.

Function **isEmpty()**

* Checks if the circular doubly linked list is empty.
* Time Complexity: O(1)
* Space Complexity: O(1)

Function **insertWhileEmpty(Node\* newNode)**

* Inserts a new node when the linked list is empty.
* Time Complexity: O(1)
* Space Complexity: O(1)

Function **findIndex(int index)**

* Finds the node at a given index.
* Time Complexity: O(index)
* Space Complexity: O(1)

Function **deleteOnlyElement()**

* Deletes the only element from the linked list.
* Time Complexity: O(1)
* Space Complexity: O(1)

Function **findValue(int value)**

* Finds the index of a given value in the linked list.
* Time Complexity: O(n)
* Space Complexity: O(1)

Function **pushBack(int value)**

* Adds an element to the end of the circular doubly linked list.
* Time Complexity: O(1)
* Space Complexity: O(1)

Function **pushFront(int value)**

* Adds an element to the beginning of the circular doubly linked list.
* Time Complexity: O(1)
* Space Complexity: O(1)

Function **insertAfterIndex(int index, int value)**

* Inserts an element after a specified index.
* Time Complexity: O(index)
* Space Complexity: O(1)

Function **insertBeforeIndex(int index, int value)**

* Inserts an element before a specified index.
* Time Complexity: O(index)
* Space Complexity: O(1)

Function **popBack()**

* Removes the last element from the circular doubly linked list.
* Time Complexity: O(1)
* Space Complexity: O(1)

Function **popFront()**

* Removes the first element from the circular doubly linked list.
* Time Complexity: O(1)
* Space Complexity: O(1)

Function **deleteNode(int index)**

* Deletes the element at the specified index.
* Time Complexity: O(index)
* Space Complexity: O(1)

Function **display()**

* Displays the elements of the circular doubly linked list.
* Time Complexity: O(n)
* Space Complexity: O(1)

Function **reverse()**

* Reverses the circular doubly linked list.
* Time Complexity: O(n)
* Space Complexity: O(1)

Function **search(int value)**

* Searches for an element and returns its index.
* Time Complexity: O(n)
* Space Complexity: O(1)

Function **update(int index, int value)**

* Updates the value of a node at a given index.
* Time Complexity: O(index)
* Space Complexity: O(1)

Function **headPointer()**

* Returns the value of the head node.
* Time Complexity: O(1)
* Space Complexity: O(1)

Function **tailPointer()**

* Returns the value of the tail node.
* Time Complexity: O(1)
* Space Complexity: O(1)

Function **findLength()**

* Returns the length of the circular doubly linked list.
* Time Complexity: O(1)
* Space Complexity: O(1)

Destructor **~CircularDoublyLinkedList()**

* Frees memory by deleting all nodes in the circular doubly linked list.
* Time Complexity: O(n)
* Space Complexity: O(1)

**Main Function:**

The **main** function demonstrates the usage of various circular doubly linked list operations, including insertion, deletion, updating, searching, and reversing.