National University of Computer and Emerging Sciences

Laboratory Manual 06

for

Data Structure

Department of Computer Science

FAST-NU, Lahore, Pakistan

Objectives:

In this lab, students will practice:

- Stacks using Arrays

STACKS

Task 1:

Implement a template-based stack using Array. The required member methods are:

bool isFull(): return true if stack is full else false.
int size(): returns the count of total elements stored in the stack.
bool isEmpty(): returns true if the stack is empty else false.
bool top(T&): returns, but does not delete, the topmost element from the stack via the parameter passed by reference. It returns false via a return statement if there is no element in the stack, else it returns true and assigns the top most element to the parameter passed by reference.
void pop(): deletes the top most element from the stack. If there is no element, return some error.

Task 2:

Given an expression containing opening and closing braces, brackets, and parentheses. Implement a function "**isBalanced**" to check whether the given expression is a balanced expression or not, using your stack implementation.

bool isBalanced(string exp)

For example, {[{}{}]}[()], {{}{}}, and []{}() are balanced expressions, but {()}[] and {(}) are not balanced. In your main function, test your function using the given.
Kindly add this question in manual also

Task 3:

"Design a basic media player in C++ using a stack data structure. The player should be able to push and pop media files (such as songs) onto and off the stack, and play the topmost file."

```
class MediaPlayer {
private:
   stack<string> playlist;

public:
   void addToPlaylist(const string& media) // this function will add media onto the playlist
   void removeFromPlaylist() // it remove element from the playlist
```

```
    void play() // it will play element from the playlist
    void displayPlaylist() // it will display the playlist
};

int main() {
    MediaPlayer player;

    player.addToPlaylist("Song 1");
    player.addToPlaylist("Song 2");
    player.addToPlaylist("Song 3");

    player.displayPlaylist();

    player.play();

    player.removeFromPlaylist();

    player.displayPlaylist();

    return 0;
}
```