DAA Assignment 2

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#include <iostream>
using namespace std;

class QuickSort {
public:
    void sortWithPivot(int arr[], int size, char pivotType) {
        quickSort(arr, 0, size - 1, pivotType);
    }

private:
    void quickSort(int arr[], int low, int high, char pivotType) {
        if (low < high) {
            int pi = partition(arr, low, high, pivotType);
            quickSort(arr, low, pi - 1, pivotType);
            quickSort(arr, pi + 1, high, pivotType);
        }
    }

    int partition(int arr[], int low, int high, char pivotType) {
        int pivot;
        if (pivotType == 's') {  // 's' for start
            pivot = arr[low];
        } else if (pivotType == 'm') {  // 'm' for middle
            pivot = arr[low + (high - low) / 2];
            swap(arr[low + (high - low) / 2], arr[high]);
        } else {  // 'e' for end
            pivot = arr[high];
        }

        int i = low - 1;
        for (int j = low; j < high; j++) {
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            if (arr[j] < pivot) {
                i++;
                swap(arr[i], arr[j]);
            }
        }
        swap(arr[i + 1], arr[high]);  // Place pivot at correct position
        return i + 1;
    }
};

int main() {
    int size;
    cout << "Enter the size of the array: ";
    cin >> size;

    int* arr = new int[size];
    cout << "Enter the elements of the array: ";
    for (int i = 0; i < size; i++) {
        cin >> arr[i];
    }

    QuickSort qs;

    bool continueSorting = true;
    while (continueSorting) {
        char pivotChoice;
        cout << "Choose pivot type (s for start, m for middle, e for end): ";
        cin >> pivotChoice;

        // Perform the sort with the chosen pivot type
        qs.sortWithPivot(arr, size, pivotChoice);
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        // Display sorted array
        cout << "Sorted array with ";
        if (pivotChoice == 's') {
            cout << "start";
        } else if (pivotChoice == 'm') {
            cout << "middle";
        } else {
            cout << "end";
        }
        cout << " pivot: ";
        for (int i = 0; i < size; i++) cout << arr[i] << " ";
        cout << endl;

        // Ask user if they want to continue
        char choice;
        cout << "Do you want to sort with another pivot type? (y/n): ";
        cin >> choice;
        continueSorting = (choice == 'y' || choice == 'Y');
    }

    delete[] arr;
    return 0;
}
```

Output: