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#include <iostream>
using namespace std;

int iterative (int arr[], int a, int b) {
        int x = arr[b];
        int y = (a - 1);
            for (int i = a; i <= b - 1; i++) {
                if (arr[i] <= x) {
                    y++;
                    swap(arr[y], arr[i]);
            }
        }
                swap(arr[y + 1], arr[b]);
                return (y + 1);
        }
        void quick_sort(int arr[], int a, int b) {
            int stack[b-a+1];
            int top = -1;
            stack[++top]=a;
            stack[++top]=b;

                while(top >= 0){
                    b = stack[top--];
                    a = stack[top--];
                    int p = iterative(arr, a, b);
                        if(p-1>a){
                            stack[++top] = a;
                            stack[++top] = p - 1;
                    }
                        if(p+1<b){
                            stack[++top] = p + 1;
                            stack[++top] = b;
                        }
                    }
                }
```

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int rekursive (int ar[], int start, int end) {
	int pivot = ar[end];
	int partitionIndex = start;
	for (int i=start; i<end; i++) {
		if (ar[i] < pivot) {
			swap (ar[i], ar[partitionIndex]);
			partitionIndex++;
		}
	}
	swap (ar[partitionIndex], ar[end]);
	return partitionIndex;
}

void quickSort (int ar[], int start, int end) {
	if (start < end) {
		int partitionIndex = iterative (ar,start,end);
			quickSort (ar,start,partitionIndex-1);
			quickSort (ar,partitionIndex+1,end);
		}
	}

int main(){

	int n, pilih;

	cout << "Masukkan Jumlah Data : " ; cin >> n ;
	int a[n];

	for (int x=0 ; x<=n-1 ; x++) {
	cout << "Masukkan Angka ke-" << x+1 << " : " ; cin >> a[x];
}
   cout << endl;
	cout << "Urutkan Data : " <<endl;
	cout << "1. Iterative Quicksort :" << endl;
	cout << "2. Recursive Quicksort :" << endl;
	cout << "Masukkan Pilihan [1..2] : "; cin >> pilih;
	cout<<endl;

	if ( pilih == 1) {
	cout << "Pengurutan Data Dengan Iterative Quicksort" << endl;
	cout <<		"=========================================" << endl;
	cout << "Data Sebelum Diurutkan : ";

	for(int x=0; x<n; x++) {
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                cout << a[x] << " ";
}
                cout << endl;

                quickSort(a,0,n-1);
                cout << "Data Setelah Diurutkan : ";

        for(int x=0; x<n; x++){
                cout<<a[x]<<" ";
 }
                cout<<endl;
        }

        else if ( pilih == 2) {
                cout << "Pengurutan Data Dengan Rekursive Quicksort" << endl;
                cout <<         "=========================================" << endl;
                cout <<         "Data Sebelum Diurutkan : ";

        for(int x=0; x<n; x++) {
                cout << a[x] << " ";
        }
                cout << endl;
                quickSort (a,0,n-1);
                cout << "Data Setelah Diurutkan : ";

        for(int x=0;x<n;x++) {
                cout<<a[x]<<" ";
 }
                cout<<endl;
        }
}
```
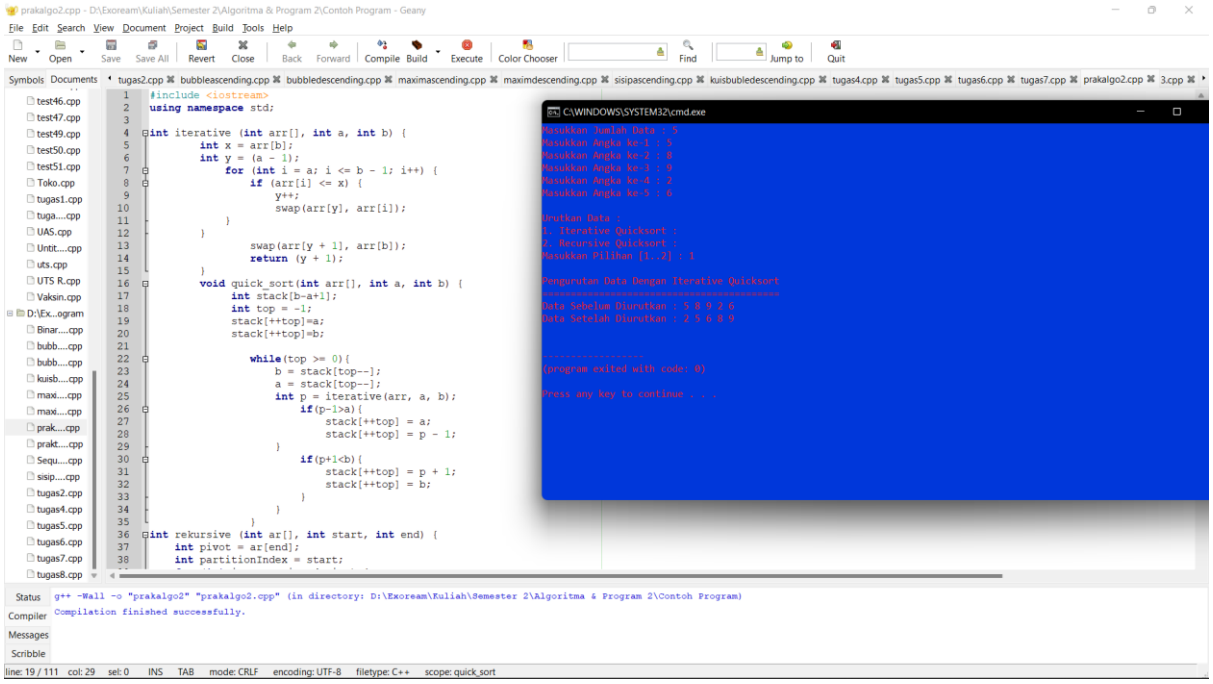
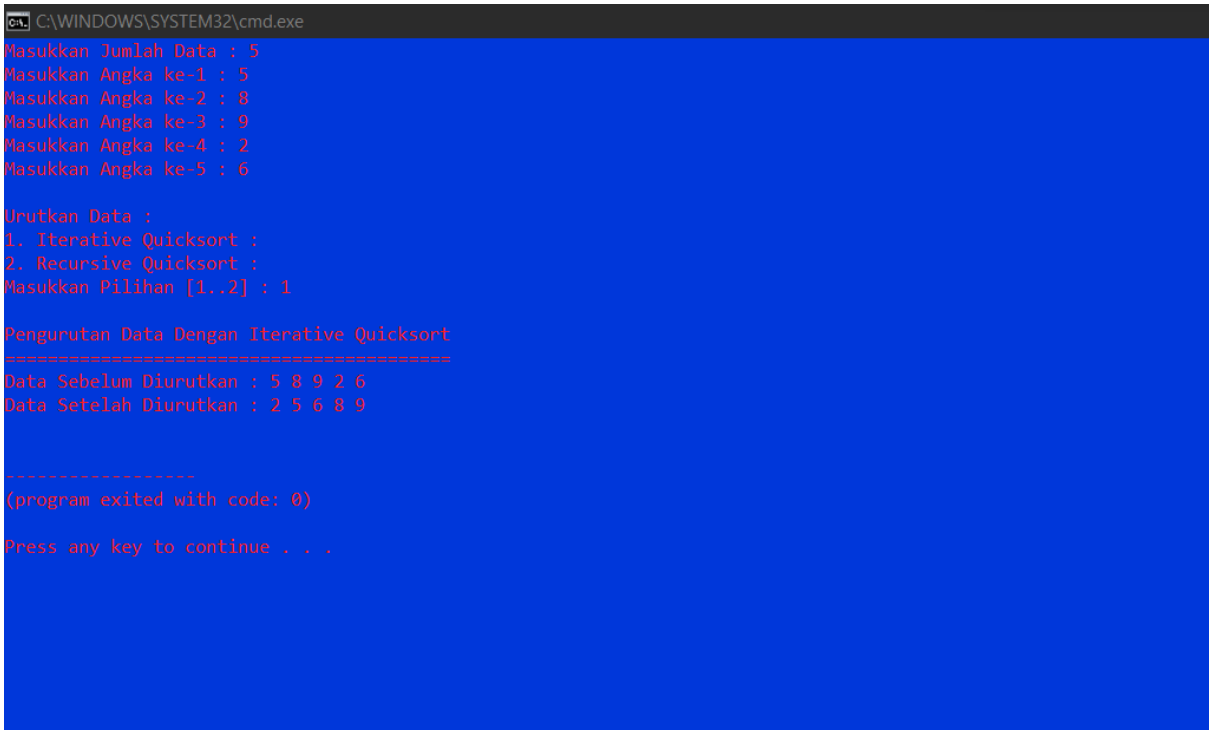

# Iterative Quicksort



# Recursive Quicksort