EECE 7205: Introduction of Computer Engineering

Assignment 1

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# Q1

## Codes:

#include <time.h>

#include <iostream>

using namespace std;

void merge\_array(int arr[], int l, int m, int r) {

int i, j, k;

int n1 = m - l + 1;

int n2 = r - m;

int L[n1], R[n2];

for (i=0;i<n1;i++) {

L[i]=arr[l+i];

}

for (j=0;j<n2;j++) {

R[j]=arr[m+1+j];

}

i=0; j=0; k=l;

while(i<n1&&j<n2) {

if(L[i]<=R[j]) {

arr[k]=L[i];

i++;

}

else {

arr[k]=R[j];

j++;

}

k++;

}

while(i<n1) {

arr[k]=L[i];

i++;

k++;

}

while(j<n2) {

arr[k]=R[j];

j++;

k++;

}

return ;

}

void merge\_sort(int arr[], int l, int r) {

if (l < r) {

int m = l+(r-l)/2;

merge\_sort(arr, l, m);

merge\_sort(arr, m+1, r);

merge\_array(arr, l, m, r);

}

return ;

}

void insertionSort(int arr[], int length) {

int i, j, tmp;

for (i = 1; i < length; i++) {

j = i;

while (j > 0 && arr[j - 1] > arr[j]) {

tmp = arr[j];

arr[j] = arr[j - 1];

arr[j - 1] = tmp;

j--;

}

}

}

int main() {

int n = 10000;

int tmp = n;

int arr[n];

for(int i=0;i<tmp;i++){

arr[i] = tmp;

tmp--;

}

clock\_t insertion\_time\_start = clock();

insertionSort(arr, n);

clock\_t insertion\_time\_end = clock();

tmp = n;

for(int i=0;i<tmp;i++){

arr[i] = tmp;

tmp--;

}

clock\_t merge\_time\_start = clock();

merge\_sort(arr, 0, n-1);

clock\_t merge\_time\_end = clock();

cout << "Input size(n) : " << n << endl;

cout << "Processing time of insertion sort : " << (float)(insertion\_time\_end - insertion\_time\_start)/CLOCKS\_PER\_SEC << " seconds" << endl;

cout << "Processing time of merge sort : " << (float)(merge\_time\_end - merge\_time\_start)/CLOCKS\_PER\_SEC << " seconds" << endl;

return 0;

}

## Results:

Text

Description automatically generated

Text

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Text

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