Laporan Uas

Algoritma Dan Pemrograman II

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PROGRAM STUDI TEKNIK INFORMATIKA

FAKULTAS ILMU KOMPUTER

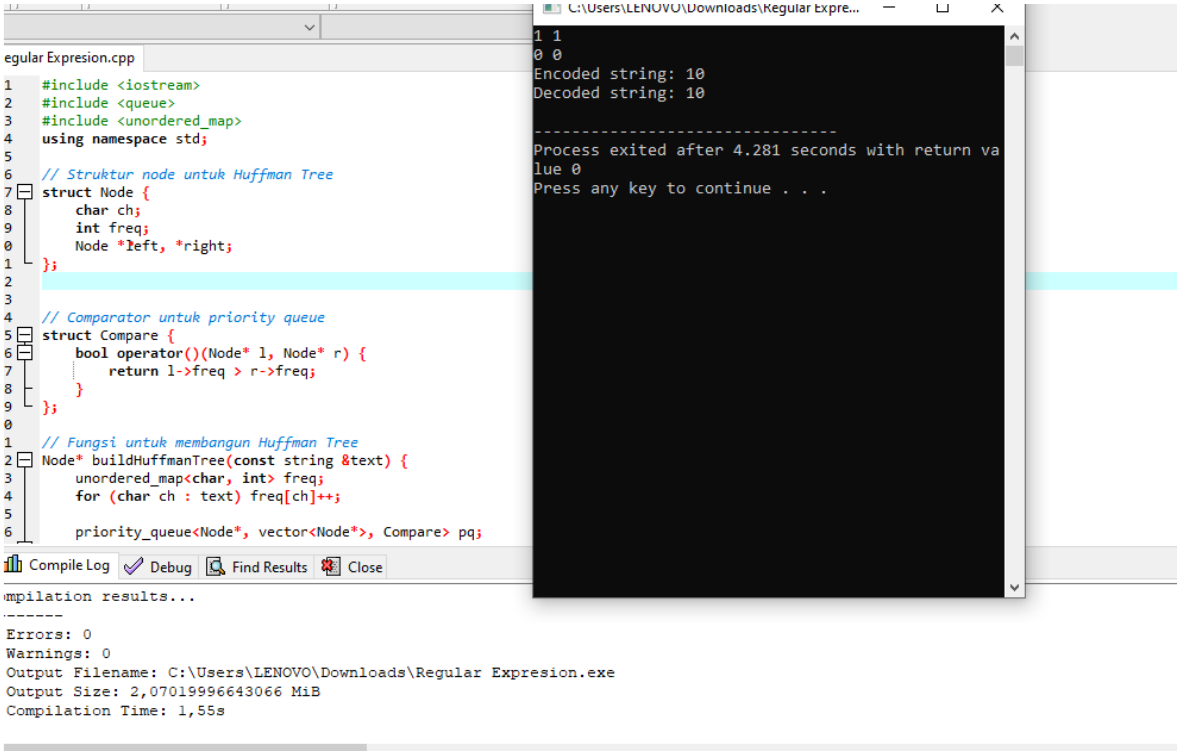
UNIVERSITAS PAMULANG

1. #include <iostream>

#include <queue>

```
#include <unordered_map>
using namespace std;

// Struktur node untuk Huffman Tree
struct Node {
    char ch;
    int freq;
    Node *left, *right;
};

// Comparator untuk priority queue
struct Compare {
    bool operator()(Node* l, Node* r) {
        return l->freq > r->freq;
    }
};

// Fungsi untuk membangun Huffman Tree
Node* buildHuffmanTree(const string &text) {
    unordered_map<char, int> freq;
    for (char ch : text) freq[ch]++;

    priority_queue<Node*, vector<Node*>, Compare> pq;
    for (auto pair : freq) {
        Node* node = new Node{pair.first, pair.second, nullptr, nullptr};
        pq.push(node);
    }

    while (pq.size() > 1) {
        Node* left = pq.top(); pq.pop();
        Node* right = pq.top(); pq.pop();
```

```
    Node* parent = new Node{'\0', left->freq + right->freq, left, right};

    pq.push(parent);

  }


  return pq.top();

}
```



2.

```cpp
#include <iostream>
#include <unordered_set>
using namespace std;

void findPairs(int arr1[], int n1, int arr2[], int n2, int target) {
    unordered_set<int> set1(arr1, arr1 + n1);

    for (int i = 0; i < n2; i++) {
        int complement = target - arr2[i];
        if (set1.find(complement) != set1.end()) {
            cout << "(" << complement << ", " << arr2[i] << ")\n";
        }
    }
}

int main() {
    int arr1[] = {1, 2, 4, 5, 7};
    int arr2[] = {5, 6, 3, 4, 8};
    int target = 9;

    cout << "Pasangan bilangan dengan jumlah " << target << ":\n";
    findPairs(arr1, 5, arr2, 5, target);

    return 0;
}
```

```
C:\Users\LENOVO\Downloads\no_1_C.exe
asangan bilangan dengan jumlah 9:
4, 5)
5, 4)
1, 8)

--------------------------------
rocess exited after 0.1886 seconds with return value 0
ress any key to continue . . .
```

```
Compile Log  Debug  Find Results  Close
mpilation results...
------
Errors: 0
Warnings: 0
Output Filename: C:\Users\LENOVO\Downloads\no_1_C.exe
Output Size: 1,92695331573486 MiB
Compilation Time: 1,36s
```

3.

```cpp
#include <iostream>
#include <vector>
#include <algorithm>
using namespace std;

vector<int> quickSortFunctional(const vector<int> &arr) {
    if (arr.size() <= 1) return arr;

    int pivot = arr[arr.size() / 2];
    vector<int> less, equal, greater;

    for (int num : arr) {
        if (num < pivot) less.push_back(num);
        else if (num == pivot) equal.push_back(num);
        else greater.push_back(num);
    }

    auto sortedLess = quickSortFunctional(less);
    auto sortedGreater = quickSortFunctional(greater);

    sortedLess.insert(sortedLess.end(), equal.begin(), equal.end());
    sortedLess.insert(sortedLess.end(), sortedGreater.begin(), sortedGreater.end());
    return sortedLess;
}

int main() {
```

```
Hasil Quick Sort: 1 1 2 3 6 8 10

--------------------------------
Process exited after 0.1706 seconds with return value 0
Press any key to continue . . .
```

```
Compile Log  Debug  Find Results  Close
ilation results...
----
rors: 0
rnings: 0
tput Filename: C:\Users\LENOVO\Downloads\no_1_C.exe
tput Size: 1,8985538482666 MiB
mpilation Time: 1,78s
```

4.

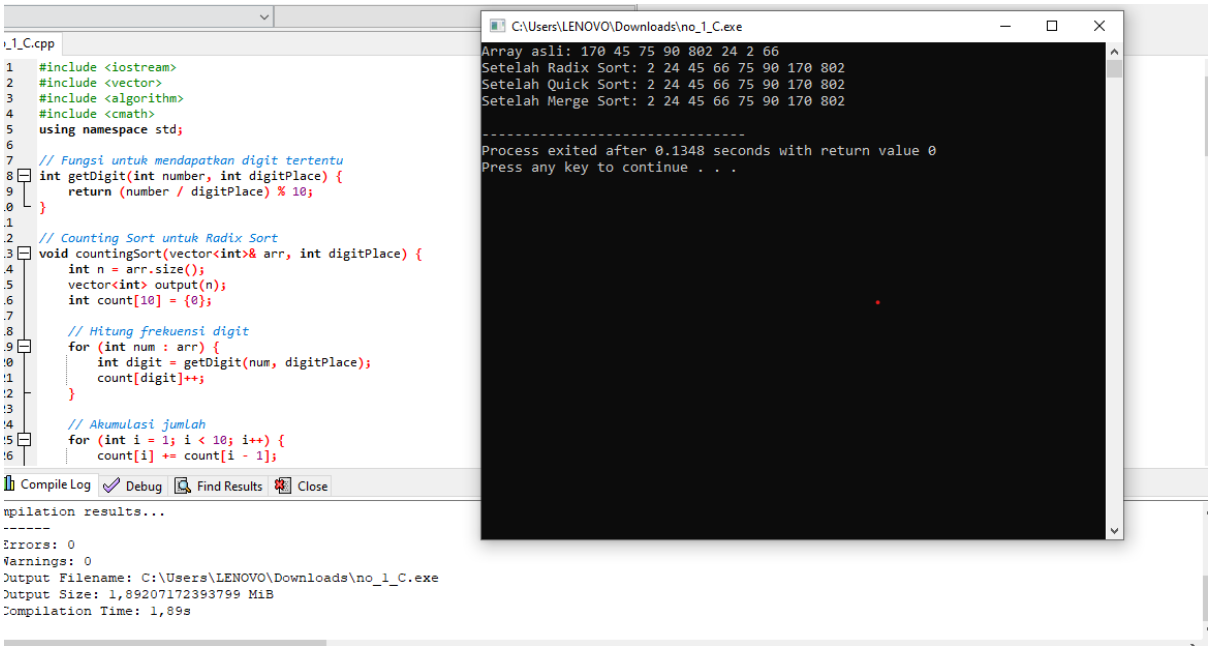
```
 #include <iostream>
#include <vector>
#include <algorithm>
#include <cmath>
using namespace std;

// Fungsi untuk mendapatkan digit tertentu
int getDigit(int number, int digitPlace) {
    return (number / digitPlace) % 10;
}

// Counting Sort untuk Radix Sort
void countingSort(vector<int>& arr, int digitPlace) {
    int n = arr.size();
    vector<int> output(n);
    int count[10] = {0};

    // Hitung frekuensi digit
    for (int num : arr) {
        int digit = getDigit(num, digitPlace);
        count[digit]++;
    }
```

```
    // Akumulasi jumlah
    for (int i = 1; i < 10; i++) {
        count[i] += count[i - 1];
    }

    // Bangun array terurut berdasarkan digit
    for (int i = n - 1; i >= 0; i--) {
        int digit = getDigit(arr[i], digitPlace);
        output[count[digit] - 1] = arr[i];
        count[digit]--;
    }

    // Salin hasil ke array asli
    arr = output;
}

// Radix Sort
void radixSort(vector<int>& arr) {
    int maxVal = *max_element(arr.begin(), arr.end());
    for (int digitPlace = 1; maxVal / digitPlace > 0; digitPlace *= 10) {
        countingSort(arr, digitPlace);
    }
}

// Quick Sort
void quickSort(vector<int>& arr, int low, int high) {
    if (low < high) {
        int pivot = arr[high];
        int i = low - 1;

        for (int j = low; j < high; j++) {
```

```
        if (arr[j] < pivot) {
            i++;
            swap(arr[i], arr[j]);
        }
    }
    swap(arr[i + 1], arr[high]);
    int pi = i + 1;

    quickSort(arr, low, pi - 1);
    quickSort(arr, pi + 1, high);
  }
}

// Merge Sort
void merge(vector<int>& arr, int left, int mid, int right) {
  int n1 = mid - left + 1, n2 = right - mid;
  vector<int> L(arr.begin() + left, arr.begin() + mid + 1);
  vector<int> R(arr.begin() + mid + 1, arr.begin() + right + 1);

  int i = 0, j = 0, k = left;
  while (i < n1 && j < n2) {
    if (L[i] <= R[j]) {
        arr[k++] = L[i++];
    } else {
        arr[k++] = R[j++];
    }
  }
  while (i < n1) arr[k++] = L[i++];
  while (j < n2) arr[k++] = R[j++];
}
```

```
void mergeSort(vector<int>& arr, int left, int right) {
    if (left < right) {
        int mid = left + (right - left) / 2;
        mergeSort(arr, left, mid);
        mergeSort(arr, mid + 1, right);
        merge(arr, left, mid, right);
    }
}

int main() {
    vector<int> arr = {170, 45, 75, 90, 802, 24, 2, 66};
    vector<int> radixArr = arr, quickArr = arr, mergeArr = arr;

    cout << "Array asli: ";
    for (int num : arr) cout << num << " ";
    cout << endl;

    // Radix Sort
    radixSort(radixArr);
    cout << "Setelah Radix Sort: ";
    for (int num : radixArr) cout << num << " ";
    cout << endl;

    // Quick Sort
    quickSort(quickArr, 0, quickArr.size() - 1);
    cout << "Setelah Quick Sort: ";
    for (int num : quickArr) cout << num << " ";
    cout << endl;

    // Merge Sort
    mergeSort(mergeArr, 0, mergeArr.size() - 1);
```

```
    cout << "Setelah Merge Sort: ";
    for (int num : mergeArr) cout << num << " ";
    cout << endl;

    return 0;
}
```



5. #include <iostream>

#include <cmath>

#include <vector>

using namespace std;

// Fungsi rekursif untuk menggambar segitiga

void drawSierpinski(vector<vector<char>>& canvas, int x, int y, int size) {

    if (size == 1) { // Base case: ukuran terkecil

        canvas[y][x] = '*'; // Gambar titik

        return;

    }

    // Bagian tengah

```
    int half = size / 2;

    // Rekursi untuk 3 bagian segitiga
    drawSierpinski(canvas, x, y, half);          // Segitiga atas
    drawSierpinski(canvas, x - half, y + half, half); // Segitiga kiri bawah
    drawSierpinski(canvas, x + half, y + half, half); // Segitiga kanan bawah
}

int main() {
    int size = 32; // Ukuran sisi segitiga (harus pangkat 2)
    vector<vector<char>> canvas(size, vector<char>(size * 2, ' ')); // Kanvas

    // Panggil fungsi untuk menggambar Sierpinski Triangle
    drawSierpinski(canvas, size - 1, 0, size);

    // Tampilkan hasil di konsol
    for (const auto& row : canvas) {
        for (char ch : row) cout << ch;
        cout << endl;
    }

}#include <iostream>
#include <cmath>
#include <vector>
using namespace std;

// Fungsi rekursif untuk menggambar segitiga
void drawSierpinski(vector<vector<char>>& canvas, int x, int y, int size) {
    if (size == 1) { // Base case: ukuran terkecil
        canvas[y][x] = '*'; // Gambar titik
        return;
```

```
    }

    // Bagian tengah
    int half = size / 2;

    // Rekursi untuk 3 bagian segitiga
    drawSierpinski(canvas, x, y, half);          // Segitiga atas
    drawSierpinski(canvas, x - half, y + half, half); // Segitiga kiri bawah
    drawSierpinski(canvas, x + half, y + half, half); // Segitiga kanan bawah
}

int main() {
    int size = 32; // Ukuran sisi segitiga (harus pangkat 2)
    vector<vector<char>> canvas(size, vector<char>(size * 2, ' ')); // Kanvas

    // Panggil fungsi untuk menggambar Sierpinski Triangle
    drawSierpinski(canvas, size - 1, 0, size);

    // Tampilkan hasil di konsol
    for (const auto& row : canvas) {
        for (char ch : row) cout << ch;
        cout << endl;
    }

}
```

```cpp
#include <iostream>
#include <cmath>
#include <vector>
using namespace std;

// Fungsi rekursif untuk menggambar segitiga
void drawSierpinski(vector<vector<char>>& canvas, int x, int y, int
    if (size == 1) { // Base case: ukuran terkecil
        canvas[y][x] = '*'; // Gambar titik
        return;
    }

    // Bagian tengah
    int half = size / 2;

    // Rekursi untuk 3 bagian segitiga
    drawSierpinski(canvas, x, y, half);            // Segitiga atas
    drawSierpinski(canvas, x - half, y + half, half); // Segitiga
    drawSierpinski(canvas, x + half, y + half, half); // Segitiga
}

int main() {
    int size = 32; // Ukuran sisi segitiga (harus pangkat 2)
    vector<vector<char>> canvas(size, vector<char>(size * 2, ' '));

    // Panggil fungsi untuk menggambar Sierpinski Triangle
```

C:\Users\LENOVO\Downloads\no_1_C.exe

Compile Log | Debug | Find Results | Close

```
ilation results...
-----
rors: 0
rnings: 0
tput Filename: C:\Users\LENOVO\Downloads\no_1_C.exe
tput Size: 1,87459087371826 MiB
mpilation Time: 6,24s
```

l: 0 Lines: 35 Length: 1063 Insert Done parsing in 0.015 seconds