```cpp
#include <iostream>
#include <string>
#include <chrono>

using namespace std;
using namespace std::chrono;

//Andrew Virya Victorio_32200091
struct Patient {

    string name;
    string disease;
};

//Maria Yosephine_32200027
//PRINT
void print (Patient arrPatients[], int data){

    for ( int i = 0; i < data; i++ ){
        cout << "Nama Pasien Setelah Diurutkan : " << arrPatients[i].name << e
ndl;
    }
}

//Maria Yosephine_32200027
//SEQUENTIAL SEARCH FUNCTION
Patient seqSearch ( Patient arrPatients[], int data, string name ){

    Patient patient;

    for ( int i = 0; i < data; i++ ){
        if ( arrPatients[i].name == name ){
            patient = arrPatients[i];

            cout << "Pasien ditemukan";
        }
        else if ( i == data - 1 ){
            cout << "Pasien tidak ditemukan, coba lagi!" << endl;
        }
    }

    return patient;
}

//Andrew Virya Victorio_32200091
//BINARY SEARCH FUNCTION
Patient binSearch ( Patient arrPatients[], int data, string name ){
```

```
    Patient patient;

    int left = 0;
    int right = data - 1;
    int mid;
    bool found = false;

    while ( left <= right ){
        mid = (left + right) / 2;

        if ( name == arrPatients[mid].name ){
            found = true;
            patient = arrPatients[mid];
            break;
        }

        else if ( name < arrPatients[mid].name ){
            right = mid - 1;
        }

        else {
            left = mid + 1;
        }
    }

    if ( found == true ){
        cout << "Data Pasien Ditemukan" << endl;
    }

    else {
        cout << "Pasien tidak ditemukan, coba lagi!" << endl;
    }

    return patient;
}

//Maria Yosephine_32200027
//PATIENT DATA
Patient patientData (){

    Patient patient;

    cout << "Masukkan nama pasien : ";
    getline ( cin, patient.name );

    cout << "Masukkan penyakit pasien : ";
    getline ( cin, patient.disease );
```

```
    return patient;
}

//Andrew Virya Victorio_32200091
//MAIN PROGRAM
int main (){

    int data;
    int i;
    string name;
    Patient arrPatients[10] = {};

    cout << "Searching Program!!\n";
    cout << "==================================\n";
    cout << "Masukkan banyak data : ";
    cin >> data;
    cout << "\n";
    cin.ignore();

    for ( int i = 0; i < data; i++ ){
        Patient patient;
        cout << "Data Pasien Ke-" << i+1 << endl;
        patient = patientData();
        arrPatients[i] = patient;
        cout << "==================================\n";
    }

    //SORTING
    for ( int i = 0; i < data; i++ ){
        for ( int j = 0; j < i; j++ ){
            if ( arrPatients[j].name > arrPatients[i].name ){

                Patient temp = arrPatients[j];
                arrPatients[j] = arrPatients[i];
                arrPatients[i] = temp;

            }
        }
    }

    print(arrPatients, data);

    cout << "Masukkan nama yang ingin dicari : ";
    getline (cin, name);

    auto begin = steady_clock::now();

    //NB: Kami menggunakan fungsi searching
```

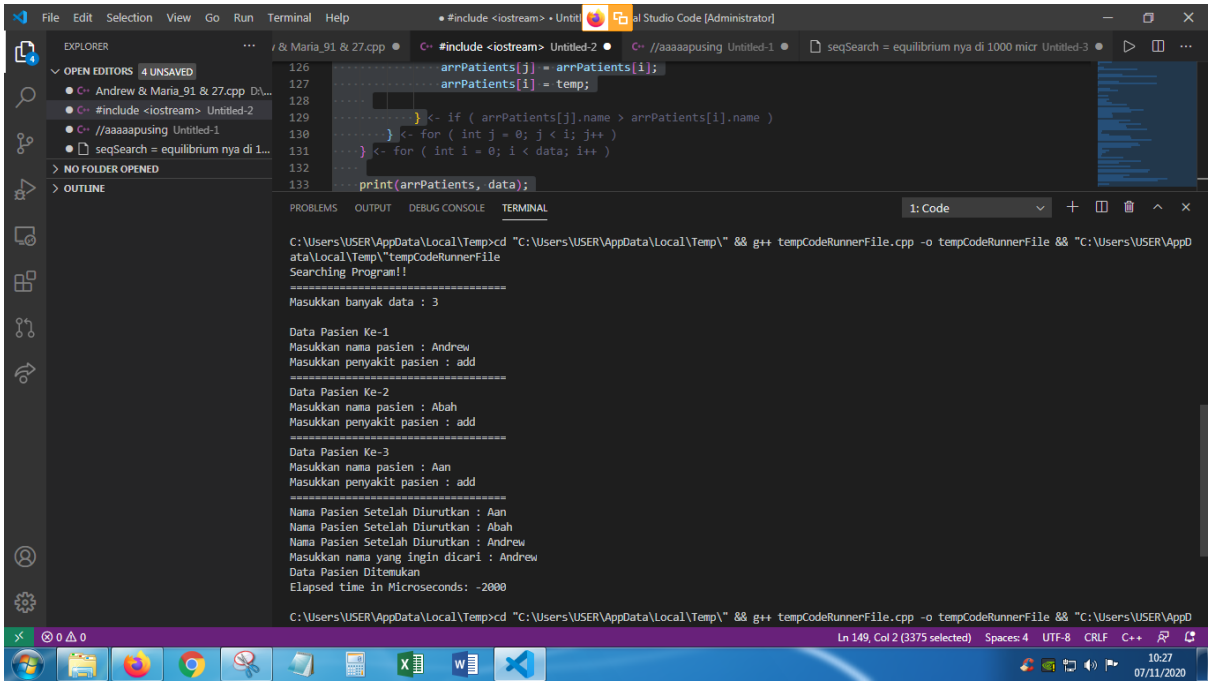
```
    //    sehingga tidak diperlukan 2 code
    //    berbeda. Cukup matikan atau nyalakan
    //    commentnya saja untuk menggunakan
    //    fungsinya.

    //Patient patient = seqSearch(arrPatients, data, name);
    Patient patient = binSearch(arrPatients, data, name);

    auto stop = steady_clock::now();
    auto time = begin - stop;
    double elapsedTime = double( duration_cast <microseconds> (time).count() )
;
    cout << "Elapsed time in Microseconds: " << elapsedTime << endl;

    return 0;
}


//ALGORITHM

/*
#include <iostream>
#include <string>
#include <chrono>

using namespace std;
using namespace std::chrono;

//Andrew Virya Victorio_32200091
Patient : struct {
    name : string
    disease : string
}

//Maria Yosephine_32200027
//PRINT
print : void (arrPatients[] : Patient, data : integer){

    for <-- integer i = 0; i to data; do
        write (Nama Pasien Setelah Diurutkan : )

}

//Maria Yosephine_32200027
//SEQUENTIAL SEARCH FUNCTION
seqSearch : Patient ( arrPatients[] : Patient, data : int, name : string ){

    patient : Patient
```

```
    for <-- int i = 0; i to data; do
        if ( arrPatients[i].name == name ){
            patient = arrPatients[i];

            write (Pasien ditemukan)
        }
        else if ( i == data - 1 ){
            write (Pasien tidak ditemukan, coba lagi!)
        }


    return patient
}

//Andrew Virya Victorio_32200091
//BINARY SEARCH FUNCTION
binSearch : Patient ( arrPatients[] : Patient, data : int, name : string ){

    patient : Patient

    left = 0 : integer
    right = data - 1 : integer
    mid : integer
    found = false : bool

    while ( left <= right ){
        mid = (left + right) / 2;

        if ( name == arrPatients[mid].name ){
            found = true;
            patient = arrPatients[mid];
            break;
        }

        else if ( name < arrPatients[mid].name ){
            right = mid - 1;
        }

        else {
            left = mid + 1;
        }
    }

    if ( found == true ){
        write (Data Pasien Ditemukan)
    }

    else {
```

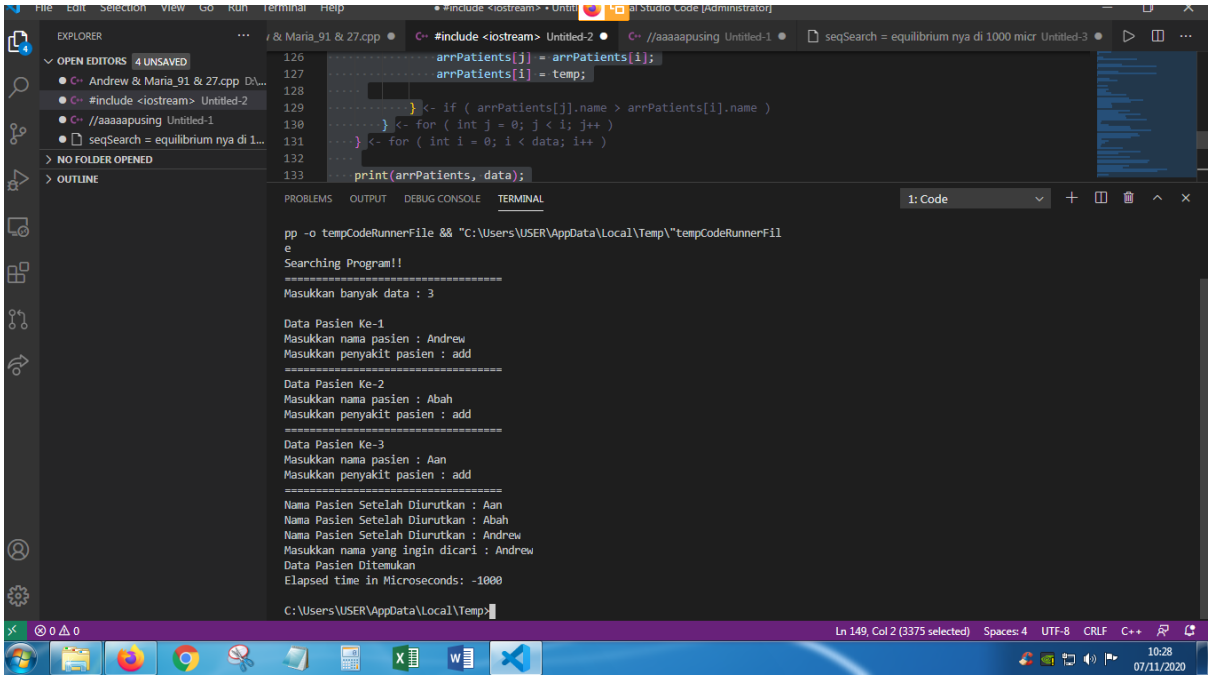
```
        write (Pasien tidak ditemukan, coba lagi!)
    }

    return patient
}

//Maria Yosephine_32200027
//PATIENT DATA
patientData : Patient (){

    patient : Patient

    write (Masukkan nama pasien : )
    getline ( read, patient.name )

    write (Masukkan penyakit pasien : )
    getline ( read, patient.disease )

    return patient
}

//Andrew Virya Victorio_32200091
//MAIN PROGRAM
int main (){

    data : integer
    i: integer
    name : string
    arrPatients[10] = {} : Patient

    write (Searching Program!!)
    write (==================================)
    write (Masukkan banyak data : )
    read : data
    read.ignore()

    for <-- int i = 0; i to data; do
        patient : Patient
        write (Data Pasien Ke-)
        patient = patientData();
        arrPatients[i] = patient;
        write (==================================)


    //SORTING
    for <-- int i = 0; i to data; do
        for <-- int j = 0; j to i; do
            if ( arrPatients[j].name > arrPatients[i].name ){
```

```
                Patient temp = arrPatients[j];
                arrPatients[j] = arrPatients[i];
                arrPatients[i] = temp;

            }



    print(arrPatients, data);

    write (Masukkan nama yang ingin dicari : )
    getline (read, name)

    auto begin = steady_clock::now();

    //NB: Kami menggunakan fungsi searching
    //    sehingga tidak diperlukan 2 code
    //    berbeda. Cukup matikan atau nyalakan
    //    commentnya saja untuk menggunakan
    //    fungsinya.

    //Patient patient = seqSearch(arrPatients, data, name)
    Patient patient = binSearch(arrPatients, data, name)

    auto stop = steady_clock::now()
    auto time = begin - stop
    double elapsedTime = double( duration_cast <microseconds> (time).count() )
    write (Elapsed time in Microseconds: )

    return 0;
}
*/



/*

- HIPOTESA :

sequential search secara data, lebih cepat dibandingkan binary search. alasann
ya
dikarenakan, sequential search mencari data secara berurut/linier. sedangkan,
binary search, mencari data secara bagi dua, yang mana berdampak pada kecepata
n
pencarian data. Kalau, data yang diinput sangat banyak, misalkan > 100 data, m
enggunakan
binary search bisa lebih cepat. Alasannya dikarenakan dia membagi dua, kalau d
ata berada
```

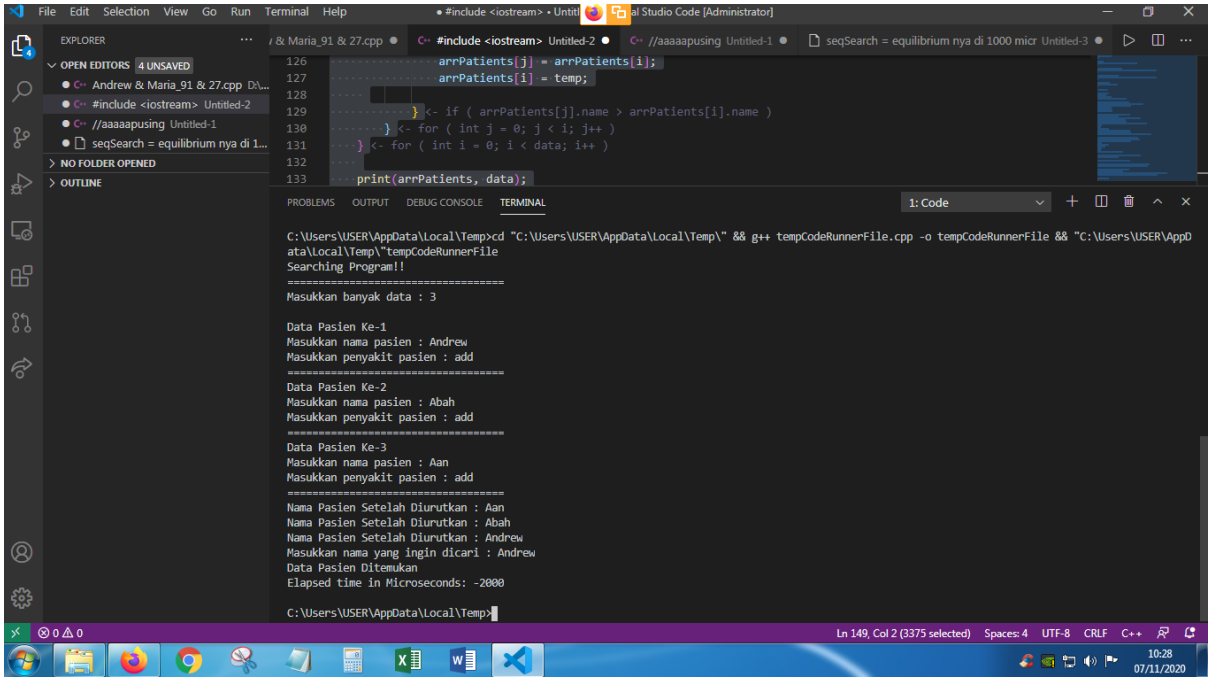
```
di sebelah kanan, sequential search harus mencari data dari kiri ke kanan, yan
g mana mem-
butuhkan waktu lebih lama. Kalau data yang digunakan sedikit, menggunakan sequ
ential search
lebih cepat.

- variable test =

1. penginputan data sebanyak 3 data
2. percobaan dilakukan sebanyak 4x
3. nama dan penyakit diinput sama semuanya selama 4x berturut-turut
4. percobaan dilakukan di sequential maupun binary dengan variable percobaan y
ang sama
5. percobaan dilakukan dengan menggunakan library chrono untuk mengukur waktu

- hasil percobaan :

seqSearch = elapsed time nya ada di kisaran rata-rata 1000 microseconds
binSearch = elapsed time nya ada di kisaran rata-rata 1000-2000 microseconds

- Kesimpulan percobaan :
Di dalam percobaan kali ini, teknik sequential search lebih cepat dibandingkan
binary search. Dikarenakan data yang dicari sedikit.
*/

/*
masukkan banyak data = done
user input banyak data = done
looping nama pasien = done
looping penyakit pasien = done
sorting nama pasien = done
searching nama Pasien = done
tampilin penyakit pasien yang di search ("nama" terkena penyakit "penyakit", s
emoga lekas sembuh)
tampilin index ke berapa
*/
```



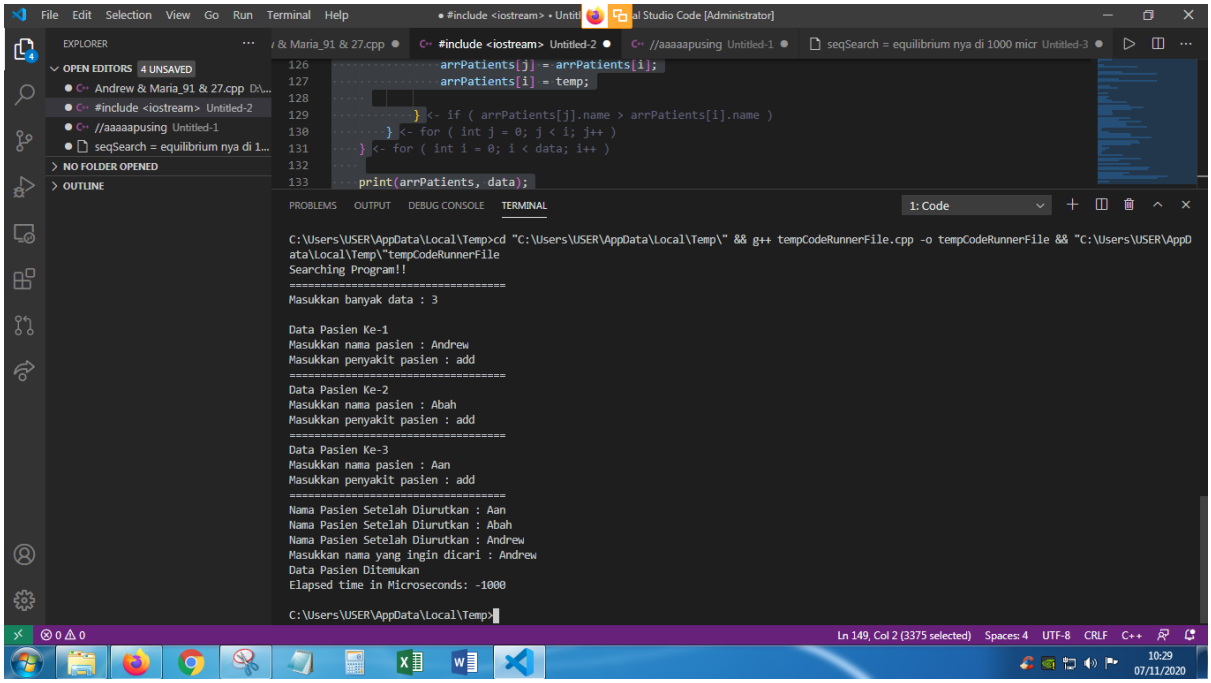
Gambar .1 : Test 1 Binary



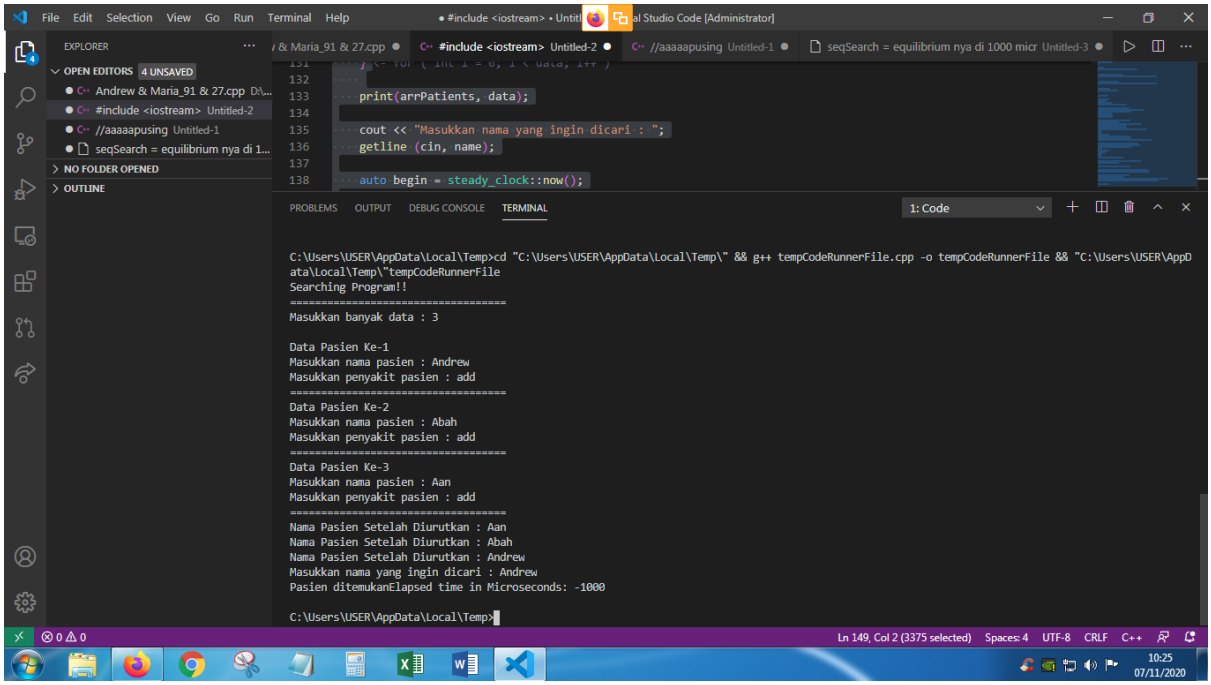
Gambar .2 Test 2 Binary



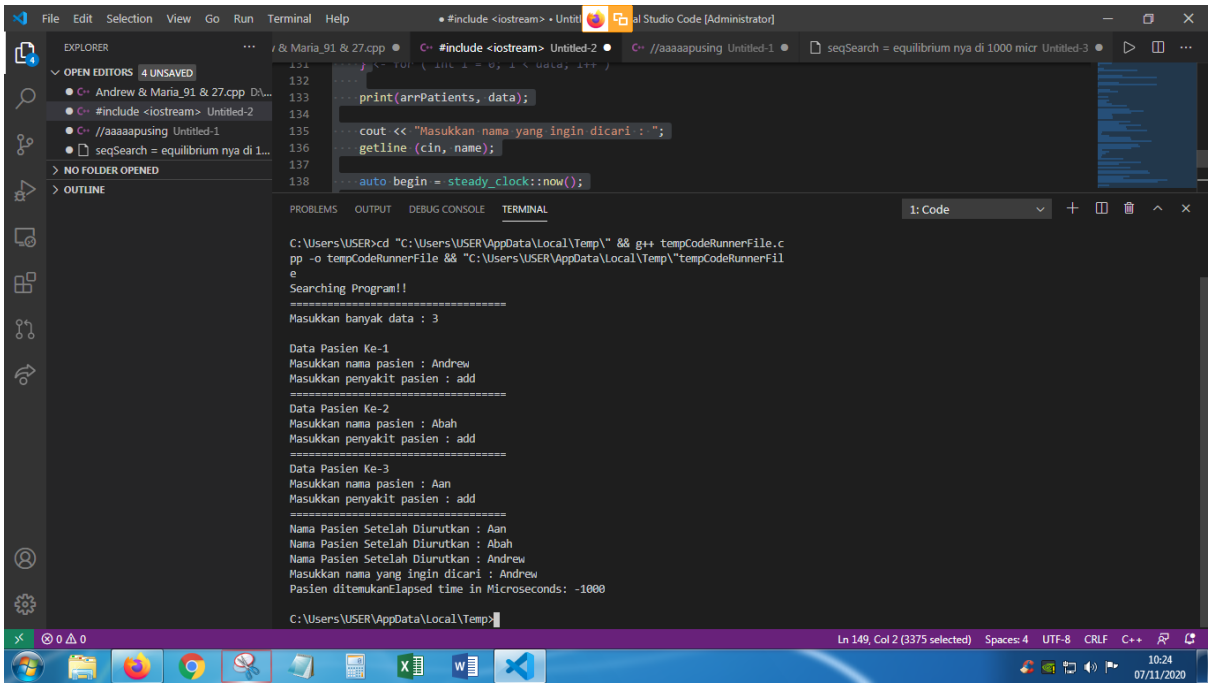
Gambar .3 Test 3 Binary



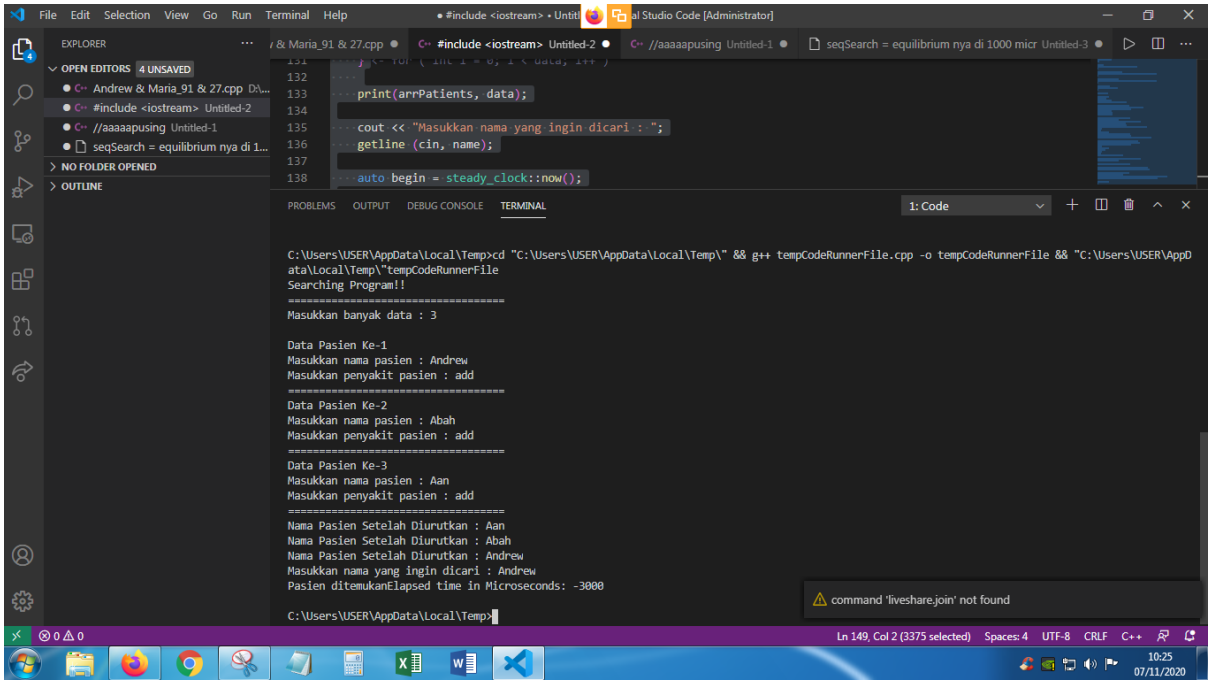
Gambar .4 Test 4 Binary



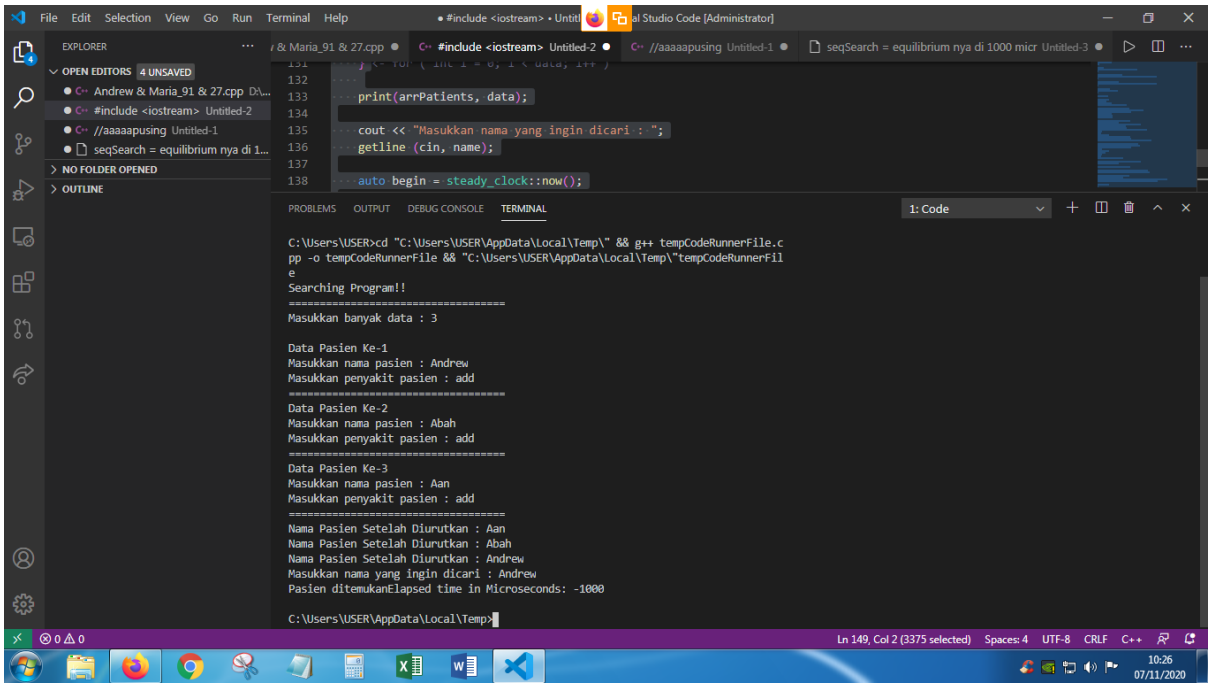
Gambar .5 Test 1 Sequential



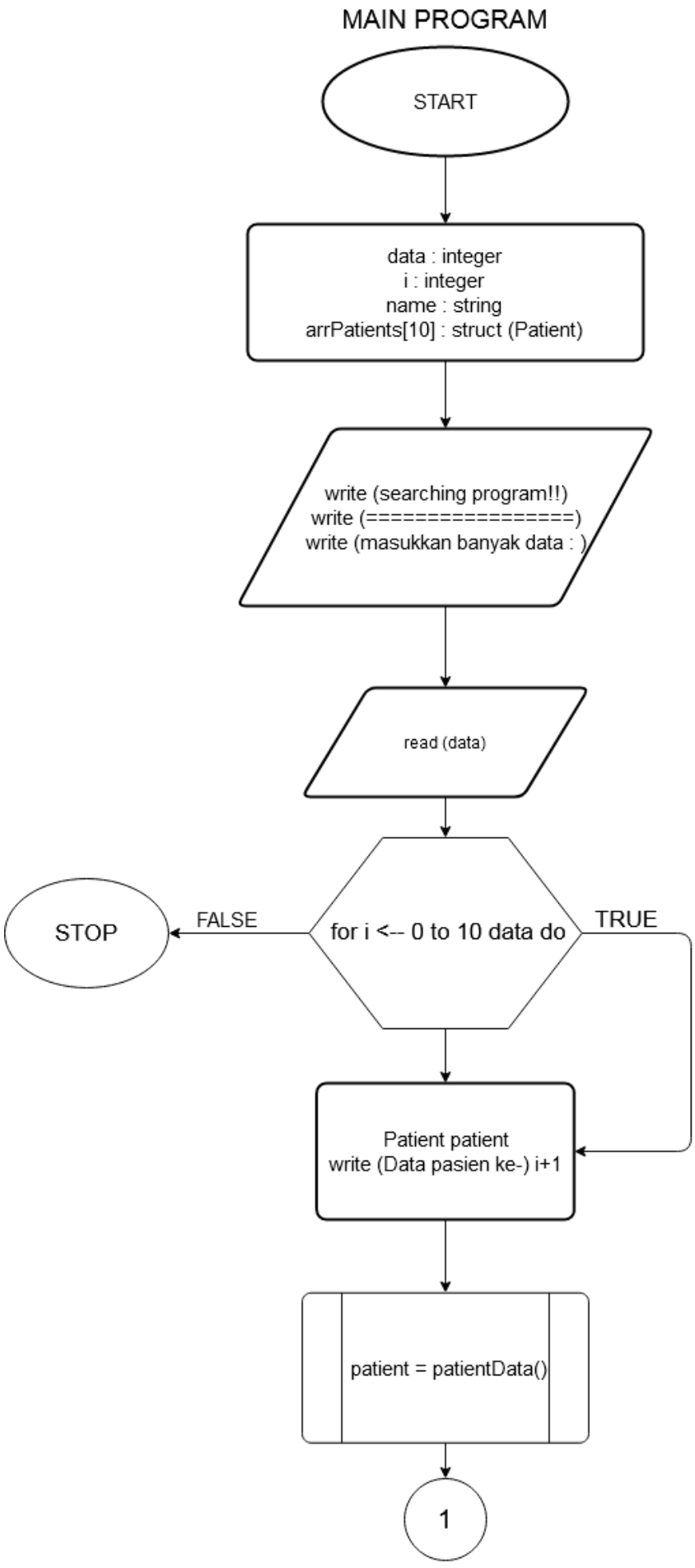
Gambar .6 Test 2 Sequential

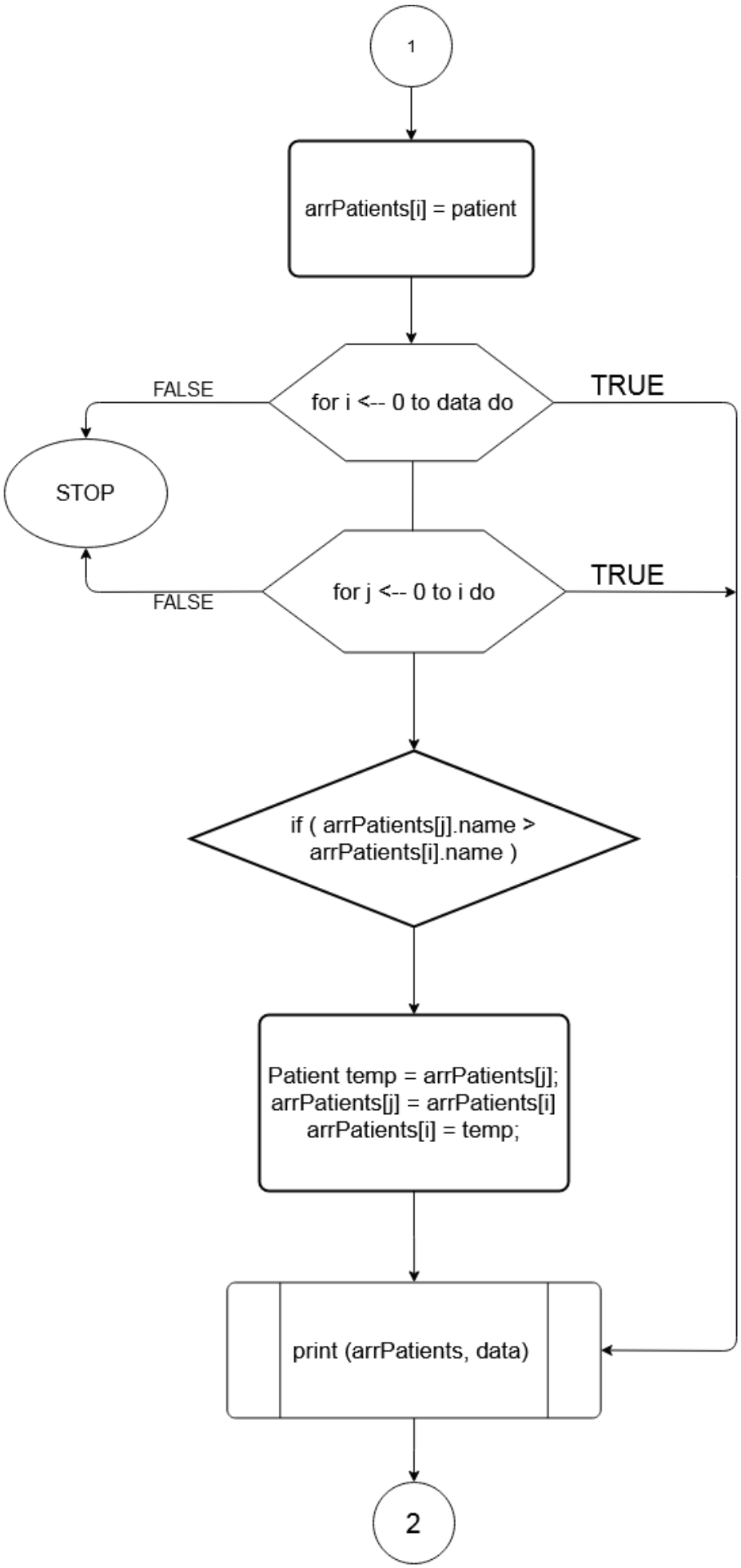


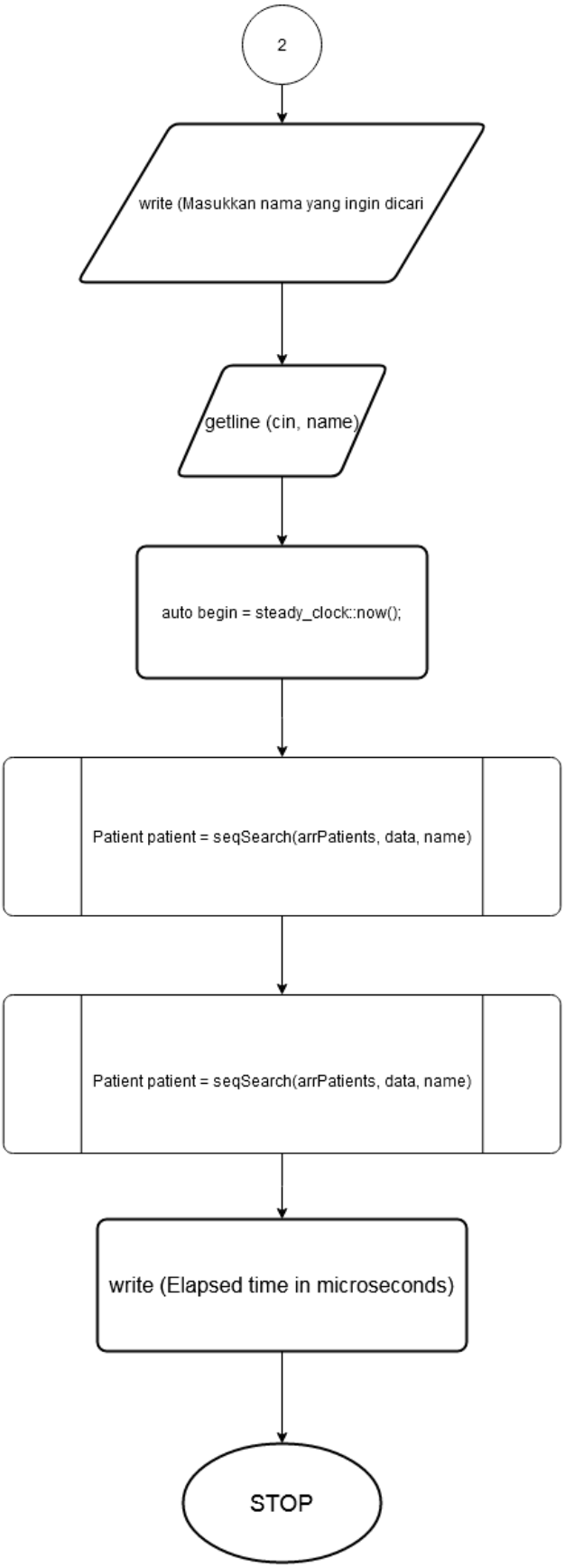
Gambar .7 Test 3 Sequential



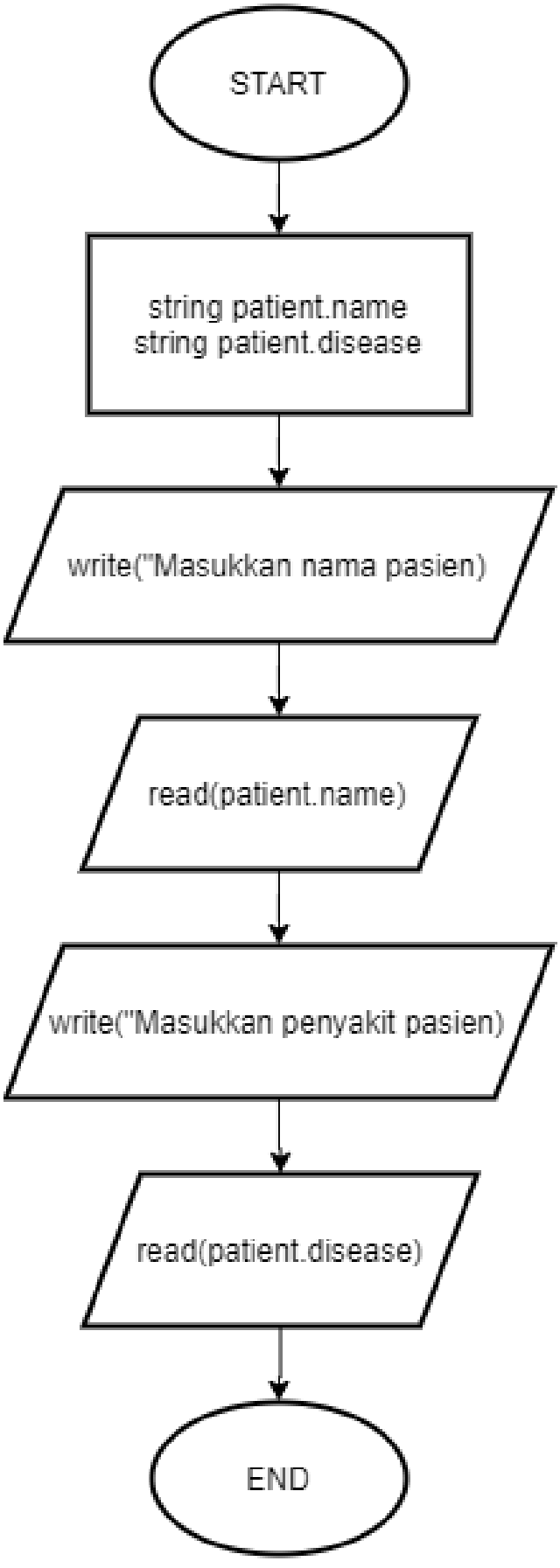
Gambar..8 Test 4 Sequential


MAIN PROGRAM
START
data : integer
i : integer
name : string
arrPatients[10] : struct (Patient)
write (searching program!!)
write (==========)
write (masukkan banyak data :)
read (data)
for i <-- 0 to 10 data do
FALSE
STOP
TRUE
Patient patient
write (Data pasien ke-) i+1
patient = patientData()
1

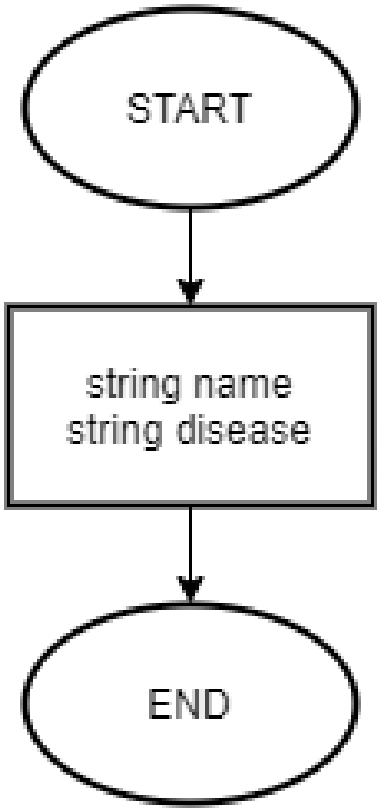

1
arrPatients[i] = patient
for i <-- 0 to data do
FALSE
TRUE
STOP
for j <-- 0 to i do
TRUE
FALSE
if (arrPatients[j].name > arrPatients[i].name)
Patient temp = arrPatients[j];
arrPatients[j] = arrPatients[i]
arrPatients[i] = temp;
print (arrPatients, data)
2


2
write (Masukkan nama yang ingin dicari
getline (cin, name)
auto begin = steady_clock::now();
Patient patient = seqSearch(arrPatients, data, name)
Patient patient = seqSearch(arrPatients, data, name)
write (Elapsed time in microseconds)
STOP

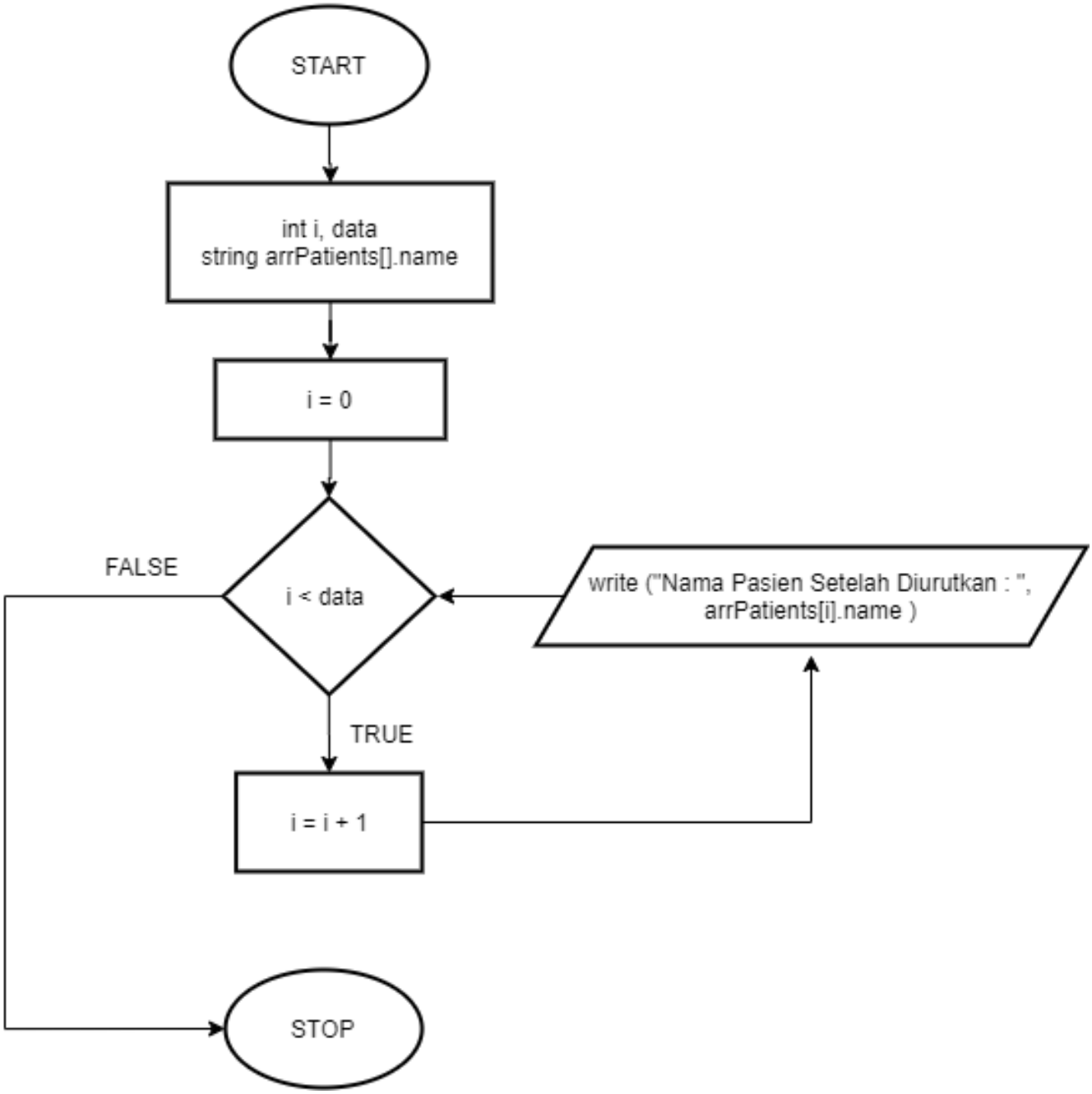
PATIENT DATA



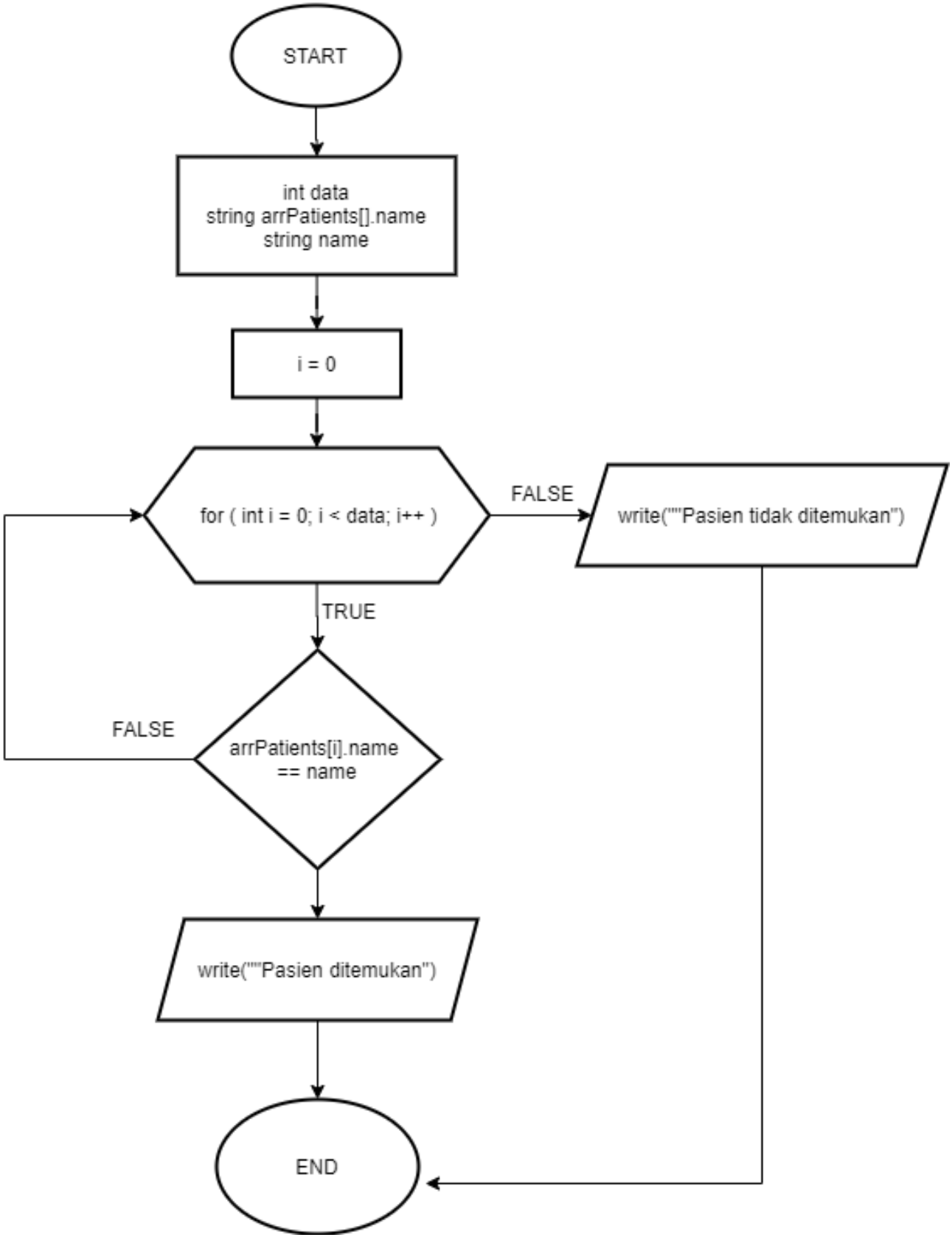
STRUCT PATIENT



VOID PRINT


START
int i, data
string arrPatients[].name
i = 0
i < data
FALSE
TRUE
write ("Nama Pasien Setelah Diurutkan : ",
arrPatients[i].name)
i = i + 1
STOP

VOID SEQUENTIAL SEARCH



VOID BINARY SEARCH