

## Lab #10

ECE 118 – Section R/RC  
Lab on Wednesday at 5:05  
Sloan Atkins

### 1. Read the Data

```
#include <iostream>
#include <iomanip>
#include <fstream>
#include <cmath>
#include <string>

using namespace std;

struct Information
{
    string firstname, lastname, password;
    int ssn, day, month, year;
};

string normalize(string name)
{
    string result = "";
    int i = 0, length = name.length(); while (i < length)
    {
        char c = name[i];
        if (islower(c))
            result = result + c;
        else
            result = result + (char)tolower(c);
        i = i + 1;
    } return result;
}

void readfile(Information info[])
{
    ifstream in;
    in.open("/home/118/database1.txt");
    if (in.fail())
    {
        cout << "Cannot read the file\n";
        exit(1);
    }
    int pos = 0;
    while (true)
    {
```

```

        in >> info[pos].firstname >> info[pos].lastname >> info[pos].ssn
            >> info[pos].day >> info[pos].month >> info[pos].year
            >> info[pos].password; if (in.fail())
                break;
        pos = pos + 1;
    }
    in.close();
    pos = 0;
    while (pos < 10)
    {
        cout << info[pos].firstname << " " << info[pos].lastname
            << " " << info[pos].ssn << " " << info[pos].day
            << " " << info[pos].month << " " << info[pos].year
            << " " << info[pos].year << " " << info[pos].password << "\n";
        pos = pos + 1;
    }
    pos = 990;
    while (pos <= 999)
    {
        cout << info[pos].firstname << " " << info[pos].lastname
            << " " << info[pos].ssn << " " << info[pos].day
            << " " << info[pos].month << " " << info[pos].year
            << " " << info[pos].year << " " << info[pos].password << "\n";
        pos = pos + 1;
    }
}
}

int main()
{
    Information info[1000];
    readfile(info);
    string name;
}

```

```

Windows 11 File Edit View Actions Devices Window Help 99% 10:52 AM Wed Nov 16 10:52:00 AM
Windows PowerShell x + 
<< " " << info[pos].year << " " << info[pos].password << "\n";
pos = pos + 1;
}
int main()
{
    Information info[1000];
    readfile(info);
    string name;
}

sma457@rabbit:~ % CC 11.cpp
sma457@rabbit:~ % a.out
Betty Lamprey 101449980 18 8 1957 1957 XaLSkKlm
Pinky Fellowes 103980155 24 6 1927 1927 v6ysEyJY
Oliver Kringle 106108994 14 3 1947 1947 ndmBaKcV
Lazarus Brown 107100005 5 10 1930 1930 dGzqfXZB
Addie Farnsworth 111186924 28 18 1944 1944 l0FtT00t
Bella Napster 112209747 27 2 1971 1971 k08eww92
Marianne Stone 112550407 16 7 1973 1973 zCzZx1ke
Apu Mitchell 113070570 4 5 1957 1957 ce9bmavv
Jilly Astor 113205300 23 18 1948 1948 OXMbSevD
Marko Sincere 113308000 7 1 1938 1938 10p1hL7a
Cora Wallace 99236644u 11 1 1938 1938 10p1hL7a
Fido Billingsley 993100062 2 8 1961 1961 Dlckt456
Darrell Condor 993400662 25 3 1966 1966 axMwzEh0
Norbert Cooke 994538286 7 11 1938 1938 CqEkH94ub
Sigmund Jaenson 995870375 36 9 1952 1952 wplLoxBX
Beatrix A. Abbott 996100000 10 10 1960 1960 10p1hL7a
Curtis Jackson 999188994 11 1 1967 1967 wjZV4uLN
Gary Reese 999190038 19 6 1978 1978 leVcVp0m
Ebola Lester 999248647 15 2 1937 1937 BBXvVoHO
Devon Paulson 999438804 19 5 1967 1967 XMgQLkT8
sma457@rabbit:~ |

```

## 2. Basic Search

```
#include <iostream>
#include <iomanip>
#include <fstream>
#include <cmath>
#include <string>

using namespace std;

struct Information
{
    string firstname, lastname, password;
    int ssn, day, month, year;
};

string normalize(string name)
{
    string result = "";
    int i = 0, length = name.length(); while (i < length)
    {
        char c = name[i];
        if (islower(c))
            result = result + c;
        else
            result = result + (char)tolower(c);
        i = i + 1;
    } return result;
}

void search(string name, Information info[])
{
    int pos = 0;
    int test = 0;
    while (pos <= 999)
    {
        string info1 = normalize(info[pos].firstname);
        string info2 = normalize(info[pos].lastname); string name1 = normalize(name);
        if (info1 == name1 || info2 == name1)
        {
            cout << info[pos].firstname << " " << info[pos].lastname << " "
                << info[pos].ssn << " " << info[pos].day << " " << info[pos].month
                << " " << info[pos].year << " " << info[pos].password << "\n"; test = test
+ 1;
        }
        pos = pos + 1;
    } if (test == 0)
        cout << "No Matches Found\n";
}
```

```

void readfile(Information info[])
{
    ifstream in;
    in.open("/home/118/database1.txt");
    if (in.fail())
    {
        cout << "Cannot read the file\n";
        exit(1);
    }
    int pos = 0;
    while (true)
    {
        in >> info[pos].firstname >> info[pos].lastname >> info[pos].ssn
            >> info[pos].day >> info[pos].month >> info[pos].year
            >> info[pos].password; if (in.fail())
                break;
        pos = pos + 1;
    }
    in.close();
    pos = 0;
    while (pos < 10)
    {
        cout << info[pos].firstname << " " << info[pos].lastname
            << " " << info[pos].ssn << " " << info[pos].day
            << " " << info[pos].month << " " << info[pos].year
            << " " << info[pos].year << " " << info[pos].password << "\n";
        pos = pos + 1;
    }
    pos = 990;
    while (pos <= 999)
    {
        cout << info[pos].firstname << " " << info[pos].lastname
            << " " << info[pos].ssn << " " << info[pos].day
            << " " << info[pos].month << " " << info[pos].year
            << " " << info[pos].year << " " << info[pos].password << "\n";
        pos = pos + 1;
    }
}

int main()
{
    Information info[1000];
    readfile(info);
    string name;
    cin >> name;
    search(name, info); }
```

```

Windows 11 File Edit View Actions Devices Window Help 95% Wed Nov 15 10:54:21 AM
Windows PowerShell - + 
}
int main()
{
    Information info[1000];
    readfile(info);
    string name;
    cin >> name; search(name, info);
}

sma457@rabbit:~ % CC lab11.cpp
sma457@rabbit:~ % a.out
Betty Lamprey 101440988 10 8 1957 1957 XaLSkKlm
Pinky Fellowes 103980155 24 6 1927 1927 v6ySeJY
Oliver Kringle 106100993 14 3 1947 1947 ndmBakcV
Larry Brown 108699448 5 1 1948 1948 4n64bkdw
Adolf Davies 111180924 28 10 1964 1964 iOftoODI
Bella Napster 112200747 27 2 1971 1971 k08emym0z
Marianne Stone 112550407 16 7 1973 1973 czczklike
Apu Mitchell 113070570 4 5 1957 1957 ce9bnaYv
Jilly Aston 113220519 23 10 1940 1940 0rM05eyD
Matilda Vincent 1146808858 7 6 1967 1967 2nFelvBa
Cora Wallace 99236064H 11 6 1938 1938 B0lpALi0
Fido Billingsley 993100062 2 8 1961 1961 DiiktK56M
Darrell Condor 993460662 25 3 1966 1966 axXmzEh0
Norbert Cooke 994630286 7 11 1938 1938 CqEkH84b
Sigmund Jameson 995870375 30 9 1952 1952 mVpLUXBX
Beatrice Abbot 998888533 7 2 1941 1941 5LFEEBeD
Curtis Croydon 999189944 11 1 1967 1967 wQZVL4LN
Gary Reese 999190938 19 6 1978 1978 leVvCPVm
Ebola Lester 999240047 15 2 1937 1937 B8XVV0H0
Devon Paulson 999430041 19 5 1967 1967 XMggLkt8
Jillian
Jillian Zilog 178940513 18 1 1949 aqPoZn7E
Jillian Avilla 817380788 6 8 1940 jlc7cHUW
sma457@rabbit:~ %

```

Activate Windows  
Go to Settings to activate Windows.

### 3. Find the Oldest

```

#include <iostream>
#include <iomanip>
#include <fstream>
#include <cmath>
#include <string>

using namespace std;

struct Information
{
    string firstname, lastname, password;
    int ssn, day, month, year;
};

void swap(Information info[], int first, int pos)
{
    Information x = info[0];
    info[0] = info[pos];
    info[pos] = x;
}

void old(Information name[], int length)
{
    Information oldest = name[0];

```

```

int i = 0;
int pos = 0;
while (i < length)
{
    if (oldest.year > name[i].year)
    {
        oldest = name[i];
        pos = i;
    }
    if (oldest.year == name[i].year && oldest.month > name[i].month)
    {
        oldest = name[i];
        pos = i;
    }
    if (oldest.year == name[i].year && oldest.month == name[i].month && oldest.day >
        name[i].day)
    {
        oldest = name[i];
        pos = i;
    }
    i = i + 1;
}
swap(name, 0, pos);
cout << oldest.firstname << " " << oldest.lastname << " " << oldest.ssn << ' '
<< oldest.day << " " << oldest.month << " " << oldest.year << " "
<< oldest.password << " " << '\n';
}

void readfile(Information info[])
{
    ifstream in;
    in.open("/home/118/database1.txt");
    if (in.fail())
    {
        cout << "Cannot read the file\n";
        exit(1);
    }

    const int N = 1000;
    info[N].firstname = " ";
    info[N].lastname = " ";
    info[N].password = " ";
    info[N].ssn = 0;
    info[N].day = 00;
    info[N].month = 00;
    info[N].year = 0000;

    int pos = 0;
}

```

```

        while (true)
    {
        in >> info[pos].firstname >> info[pos].lastname >> info[pos].ssn
            >> info[pos].day >> info[pos].month >> info[pos].year
            >> info[pos].password;
        if (in.fail())
            break;
        pos = pos + 1;
    }
    in.close();
    old(info, N);
}

int main()
{
    Information info[1001];
    readfile(info);
}

```

The screenshot shows a Windows 11 desktop environment. On the left is a Start menu with various icons like Recycle Bin, Microsoft Edge, and File Explorer. In the center, there's a code editor window titled "Windows PowerShell" with some C++ code. Below it is an "Output" window showing the build process of a program named "a.out". The command "cc 5.cpp" was run, and the output shows the file "5.cpp" was not found. The terminal window also displays the command "make" and its output.

```

Windows PowerShell
File Edit View Git Project Build Debug Test Analyze Tools Extensions Window Help Search (Ctrl+Q) coding
Windows 11
Windows PowerShell x + 
File Edit View Git Project Build Debug Test Analyze Tools Extensions Window Help Local Windows Debugger x86
readfile(Information info[])
pos = i;
if (oldest.year == name[i].year && oldest.month == name[i].month && oldest.day >
name[i].day)
{
    oldest = name[i];
    pos = i;
}
i = i + 1;
swap(name, 0, pos);
cout << oldest.firstname << " " << oldest.lastname << " " << oldest.ssn << ' '
<< oldest.day << " " << oldest.month << " " << oldest.year << " "
<< oldest.password << " " << '\n';
}

void youngest(Information name[], int length, int v, int last)
{
    while (v < last)
    {
        Information young = name[last];
        int i = v;
        int pos = 0;
        while (i < length)
        {
            if (young.year < name[i].year)
            {
                young = name[i];
            }
        }
        swap(name, pos, young);
        pos++;
    }
}

```

```

Output
Show output
Build start
1>----- Bu
1>Source.cpp
1>C:\Users\sm
1>Done buil
1>----- Bu
sma457@rabbit:~ % CC 5.cpp
Build: 0 succeeded, 1 failed, 0 up-to-date, 0 skipped ======
sma457@rabbit:~ % a.out
Cornelius VanderHefferlump 765236789 2 5 1896 81gFYxVI
sma457@rabbit:~ %
sma457@rabbit:~ % | : No such file or directory
sma457@rabbit:~ %

```

#### 4. Promote the Youngest

```
#include <iostream>
#include <iomanip>
#include <fstream>
#include <cmath>
#include <string>

using namespace std;

struct Information
{
    string firstname, lastname, password;
    int ssn, day, month, year;
};

void swap(Information info[], int first, int pos)
{
    Information x = info[0];
    info[0] = info[pos];
    info[pos] = x;
}

void old(Information name[], int length)
{
    Information oldest = name[0];
    int i = 0;
    int pos = 0;
    while (i < length)
    {
        if (oldest.year > name[i].year)
        {
            oldest = name[i];
            pos = i;
        }
        if (oldest.year == name[i].year && oldest.month > name[i].month)
        {
            oldest = name[i];
            pos = i;
        }
        if (oldest.year == name[i].year && oldest.month == name[i].month && oldest.day >
            name[i].day)
        {
            oldest = name[i];
            pos = i;
        }
        i = i + 1;
    }
}
```

```

swap(name, 0, pos);
cout << oldest.firstname << " " << oldest.lastname << " " << oldest.ssn << ' '
<< oldest.day << " " << oldest.month << " " << oldest.year << " "
<< oldest.password << " " << '\n';
}

void youngest(Information name[], int length)
{ Information young = name[0];
int i = 0;
int pos = 0;
while (i < length)
{
    if (young.year < name[i].year)
    {
        young = name[i];
        pos = i;
    }
    if (young.year == name[i].year && young.month < name[i].month)
    {
        young = name[i];
        pos = i;
    }
    if (young.year == name[i].year && young.month == name[i].month && young.day <
        name[i].day)
    {
        young = name[i];
        pos = i;
    }
    i = i + 1;
}
swap(name, 0, pos);
cout << young.firstname << " " << young.lastname << " " << young.ssn << ' '
<< young.day << " " << young.month << " " << young.year << " "
<< young.password << " " << '\n';
}

void readfile(Information info[])
{
ifstream in;
in.open("/home/118/database1.txt");
if (in.fail())
{
    cout << "Cannot read the file\n";
    exit(1);
}

const int N = 1000;
info[N].firstname = " ";

```

```

info[N].lastname = " ";
info[N].password = " ";
info[N].ssn = 0;
info[N].day = 00;
info[N].month = 00;
info[N].year = 0000;

int pos = 0;
while (true)
{
    in >> info[pos].firstname >> info[pos].lastname >> info[pos].ssn
    >> info[pos].day >> info[pos].month >> info[pos].year
    >> info[pos].password;
    if (in.fail())
        break;
    pos = pos + 1;
}

in.close();
old(info, N);

}

int main()
{
    Information info[1001];
    readfile(info);
}

```

```

Windows 11 File Edit View Actions Devices Window Help 48% Tue Nov 21 1:16:04 PM
Recycle Bin Microsoft Edge
File Edit View Git Project Build Debug Test Analyze Tools Extensions Window Help Search (Ctrl+Q) P Local Windows Debugger Live Share
Windows PowerShell - x + Windows 11
Windows PowerShell x + Windows 11
int i = 0;
int pos = 0;
while (i < length)
{
    if (oldest.year < name[i].year)
    {
        oldest = name[i];
        pos = i;
    }
    if (oldest.year == name[i].year && oldest.month < name[i].month)
    {
        oldest = name[i];
        pos = i;
    }
    if (oldest.year == name[i].year && oldest.month == name[i].month && oldest.day <
        name[i].day)
    {
        oldest = name[i];
        pos = i;
    }
    i = i + 1;
}
swap(name, 0, pos);
cout << oldest.firstname << " " << oldest.lastname << " " << oldest.ssn << '\n'

sma457@rabbit:~ % CC 5.cpp
sma457@rabbit:~ % a.out
Hal Morris 179199468 26 12 1984 Hx10X3k8
sma457@rabbit:~ %

```

The screenshot shows a Windows 11 desktop environment. In the center, there is a terminal window titled 'Windows PowerShell' running on a 'Windows 11' system. The terminal displays a C++ program that reads a file named 'info' containing information about people (firstname, lastname, ssn, day, month, year) and finds the oldest person. The output of the program is 'Hal Morris 179199468 26 12 1984 Hx10X3k8'. The desktop background is blue, and the taskbar at the bottom shows various icons for common Windows applications like File Explorer, Task View, and Start.

## 5. Now Promote the Second Youngest

```
#include <iostream>
#include <iomanip>
#include <fstream>
#include <cmath>
#include <string>

using namespace std;

struct Information
{
    string firstname, lastname, password;
    int ssn, day, month, year;
};

void swap(Information info[], int first, int pos)
{
    Information x = info[first];
    info[first] = info[pos];
    info[pos] = x;
}

void old(Information name[], int length)
{
    Information oldest = name[0];
    int i = 0;
    int pos = 0;
    while (i < length)
    {
        if (oldest.year > name[i].year)
        {
            oldest = name[i];
            pos = i;
        }
        if (oldest.year == name[i].year && oldest.month > name[i].month)
        {
            oldest = name[i];
            pos = i;
        }
        if (oldest.year == name[i].year && oldest.month == name[i].month && oldest.day >
            name[i].day)
        {
            oldest = name[i];
            pos = i;
        }
        i = i + 1;
    }
    swap(name, 0, pos);
    cout << oldest.firstname << " " << oldest.lastname << " " << oldest.ssn << ' '
        << oldest.day << " " << oldest.month << " " << oldest.year << " "
        << oldest.password << " " << '\n';
}
```

```

void youngest(Information name[], int length, int v, int last)
{
    while (v < 2)
    {
        Information young = name[last];
        int i = v;
        int pos = 0;
        while (i < length)
        {
            if (young.year < name[i].year)
            {
                young = name[i];
                pos = i;
            }
            if (young.year == name[i].year && young.month < name[i].month)
            {
                young = name[i];
                pos = i;
            }
            if (young.year == name[i].year && young.month == name[i].month && young.day <
                name[i].day)
            {
                young = name[i];
                pos = i;
            }
            i = i + 1;
        }
        swap(name, v, pos);
        v = v + 1;
        cout << young.firstname << " " << young.lastname << " " << young.ssn << ''
            << young.day << " " << young.month << " " << young.year << " "
            << young.password << " " << '\n';
    }
}

void readfile(Information info[])
{
    ifstream in;
    in.open("/home/118/database1.txt");
    if (in.fail())
    {
        cout << "Cannot read the file\n";
        exit(1);
    }
    const int N = 1000;
}

```

```

info[N].firstname = " ";
info[N].lastname = " ";
info[N].password = " ";
info[N].ssn = 0;
info[N].day = 00;
info[N].month = 00;
info[N].year = 0000;

int pos = 0;
while (true)
{
    in >> info[pos].firstname >> info[pos].lastname >> info[pos].ssn
        >> info[pos].day >> info[pos].month >> info[pos].year
        >> info[pos].password;
    if (in.fail())
        break;
    pos = pos + 1;
}

in.close();
youngest(info, N, 0, N);
}

```

```

int main()
{
    Information info[1001];
    readfile(info);
}

```

The screenshot shows a Windows desktop environment. In the foreground, a terminal window titled "Windows PowerShell" is open, displaying C++ code. The code includes a swap function and a youngest function. Below the terminal, a code editor window titled "11.cpp" shows the same C++ code. The code editor has tabs for "File", "Edit", "View", "Git", "Project", "Build", "Debug", "Test", "Analyze", "Tools", "Extensions", "Window", and "Help". A status bar at the bottom indicates "Ready".

```

    i = i + 1;
}
swap(name, 0, pos);
cout << name[0].firstname << " " << name[0].lastname << " " << name[0].ssn << ' '
    << name[0].day << " " << name[0].month << " " << name[0].year << " "
    << name[0].password << " " << '\n';
}

void youngest(Information name[], int length, int v, int last)
{
    while (v < 2)
    {
        Information young = name[last];
        int i = v;
        int pos = 0;
        while (i < length)
        {
            if (young.year < name[i].year)
            {
                young = name[i];
                pos = i;
            }
            if (young.year == name[i].year && young.month < name[i].month)

```

```

sma457@rabbit:~ % CC 11.cpp
sma457@rabbit:~ % a.out
Hal Morris 179190468 26 12 1984 Hx10X3k8
Imelda Jones 490220429 3 12 1984 Ml8ZaWk7
sma457@rabbit:~ %

```

## 6. More of the Same.

```

#include <iostream>
#include <iomanip>
#include <fstream>
#include <cmath>
#include <string>

using namespace std;

struct Information
{
    string firstname, lastname, password;
    int ssn, day, month, year;
};

void swap(Information info[], int first, int pos)
{
    Information x = info[first];
    info[first] = info[pos];
    info[pos] = x;
}

void old(Information name[], int length)
{
    Information oldest = name[0];
    int i = 0;
    int pos = 0;
    while (i < length)
    {
        if (oldest.year > name[i].year)
        {
            oldest = name[i];
            pos = i;
        }
        if (oldest.year == name[i].year && oldest.month > name[i].month)
        {
            oldest = name[i];
            pos = i;
        }
        if (oldest.year == name[i].year && oldest.month == name[i].month && oldest.day >
            name[i].day)
        {
            oldest = name[i];
            pos = i;
        }
        i = i + 1;
    }
    swap(name, 0, pos);
}

```

```

cout << oldest.firstname << " " << oldest.lastname << " " << oldest.ssn << ' '
<< oldest.day << " " << oldest.month << " " << oldest.year << " "
<< oldest.password << " " << '\n';
}

void youngest(Information name[], int length, int v, int last, int a)
{
    while (v < a)
    {
        Information young = name[last];
        int i = v;
        int pos = 0;
        while (i < length)
        {
            if (young.year < name[i].year)
            {
                young = name[i];
                pos = i;
            }
            if (young.year == name[i].year && young.month < name[i].month)
            {
                young = name[i];
                pos = i;
            }
            if (young.year == name[i].year && young.month == name[i].month && young.day <
                name[i].day)
            {
                young = name[i];
                pos = i;
            }
            i = i + 1;
        }
        swap(name, v, pos);
        v = v + 1;
        cout << young.firstname << " " << young.lastname << " " << young.ssn << ' '
        << young.day << " " << young.month << " " << young.year << " "
        << young.password << " " << '\n';
    }
}

void readfile(Information info[])
{
    ifstream in;
    in.open("/home/118/database1.txt");
    if (in.fail())
    {
        cout << "Cannot read the file\n";
        exit(1);
    }
}

```

```

}

const int N = 1000;
info[N].firstname = " ";
info[N].lastname = " ";
info[N].password = " ";
info[N].ssn = 0;
info[N].day = 00;
info[N].month = 00;
info[N].year = 0000;

int pos = 0;
while (true)
{
    in >> info[pos].firstname >> info[pos].lastname >> info[pos].ssn
        >> info[pos].day >> info[pos].month >> info[pos].year
        >> info[pos].password;
    if (in.fail())
        break;
    pos = pos + 1;
}

in.close();
youngest(info, N, 0, N, 3);
}

```

```

int main()
{
    Information info[1001];
    readfile(info);
}

```

The screenshot shows a Windows desktop with several open windows. In the foreground, a terminal window titled 'Windows PowerShell' displays the output of a C++ program. The program reads from a file named 'database1.txt' and finds the youngest person in the database. The output shows three records:

```

Information young = name[last];
int i = v;
int pos = 0;
while (i < length)
{
    if (young.year < name[i].year)
    {
        young = name[i];
        pos = i;
    }
    if (young.year == name[i].year && young.month < name[i].month)
    {
        young = name[i];
        pos = i;
    }
    if (young.year == name[i].year && young.month == name[i].month && young.day <
        name[i].day)
    {
        young = name[i];
        pos = i;
    }
    i = i + 1;
}

sma457@rabbit:~ % CC 13.cpp
sma457@rabbit:~ % a.out
Hal Morris 179198468 26 12 1984 Hx10X3k8
Imelda Jones 496220429 3 12 1984 M18ZaWk7
Anabel Mosley 372198403 2 11 1984 wkwU8roR
sma457@rabbit:~ %

```

Below the terminal, a code editor window titled '13.cpp' shows the C++ source code. The code defines a struct 'Information' with fields for firstname, lastname, password, ssn, day, month, and year. It includes a function 'readfile' to read from a file and a function 'youngest' to find the youngest person. The main function calls 'readfile' and then 'youngest'. The code uses standard C++ input/output streams and conditional operators.

## 7. The Ultimate Demand.

```

#include <iostream>
#include <iomanip>
#include <fstream>
#include <cmath>
#include <string>

using namespace std;

struct Information
{
    string firstname, lastname, password;
    int ssn, day, month, year;
};

void swap(Information info[], int first, int pos)
{
    Information x = info[first];
    info[first] = info[pos];
    info[pos] = x;
}

void youngest(Information name[], int length, int v, int last)
{
    while (v < last)
    {
        Information young = name[last];
        int i = v;
        int pos = 0;
        while (i < length)
        {
            if (young.year < name[i].year)
            {
                young = name[i];
                pos = i;
            }
            if (young.year == name[i].year && young.month < name[i].month)
            {
                young = name[i];
                pos = i;
            }
            if (young.year == name[i].year && young.month == name[i].month &&
young.day <
                name[i].day)
            {
                young = name[i];
                pos = i;
            }
            i = i + 1;
        }
        swap(name, pos, last);
    }
}

```

```

        }
        swap(name, v, pos);
        v = v + 1;
    }
}

void readfile(Information info[])
{
    ifstream in;
    in.open("/home/118/database100.txt");
    if (in.fail())
    {
        cout << "Cannot read the file\n";
        exit(1);
    }
    const int N = 100000;
    info[N].firstname = " ";
    info[N].lastname = " ";
    info[N].password = " ";
    info[N].ssn = 0;
    info[N].day = 00;
    info[N].month = 00;
    info[N].year = 0000;

    int pos = 0;
    while (true)
    {
        in >> info[pos].firstname >> info[pos].lastname >> info[pos].ssn
            >> info[pos].day >> info[pos].month >> info[pos].year
            >> info[pos].password;
        if (in.fail())
            break;
        pos = pos + 1;
    }

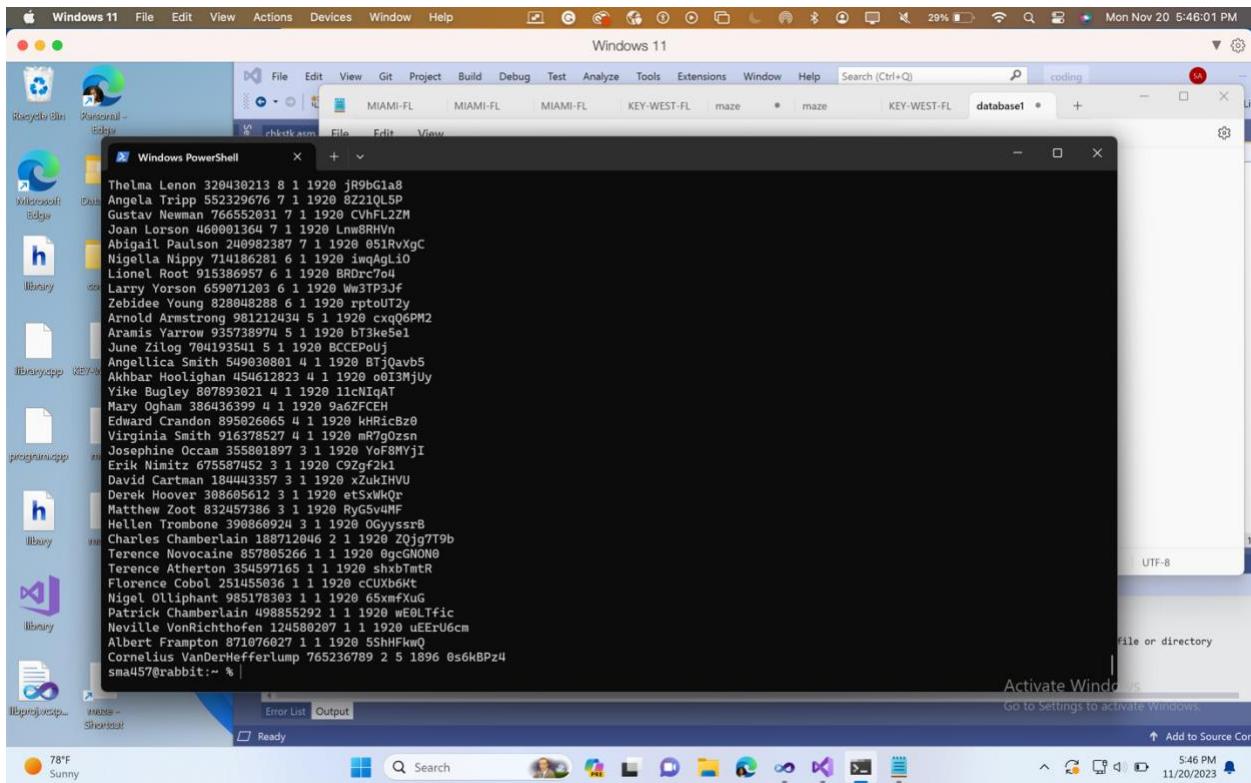
    in.close();
    youngest(info, N, 0, N);
    int i = 0;
    while (i < N)
    {
        cout << info[i].firstname << " " << info[i].lastname << " " << info[i].ssn << " " <<
        info[i].day
            << " " << info[i].month << " " << info[i].year << " " << info[i].password << "\n";
        i = i + 1;
    }
}

```

```

int main()
{
    Information info[100001];
    readfile(info);
}

```



## 8. Sorting the File.

```

#include <iostream>
#include <iomanip>
#include <fstream>
#include <cmath>
#include <string>

using namespace std;

struct Information
{
    string firstname, lastname, password;
    int ssn, day, month, year;
};

void swap(Information info[], int first, int pos)
{

```

```

Information x = info[first];
info[first] = info[pos];
info[pos] = x;
}

void youngest(Information name[], int length, int v, int last)
{
    while (v < last)
    {
        Information young = name[last];
        int i = v;
        int pos = 0;
        while (i < length)
        {
            if (young.year < name[i].year)
            {
                young = name[i];
                pos = i;
            }
            if (young.year == name[i].year && young.month < name[i].month)
            {
                young = name[i];
                pos = i;
            }
            if (young.year == name[i].year && young.month == name[i].month &&
young.day <
name[i].day)
            {
                young = name[i];
                pos = i;
            }
            i = i + 1;
        }
        swap(name, v, pos);
        v = v + 1;
    }
}

void readfile(Information info[])
{
    ifstream in;
    in.open("/home/118/database100.txt");
    if (in.fail())
    {
        cout << "Cannot read the file\n";
        exit(1);
    }
    ofstream young("young.txt");
}

```

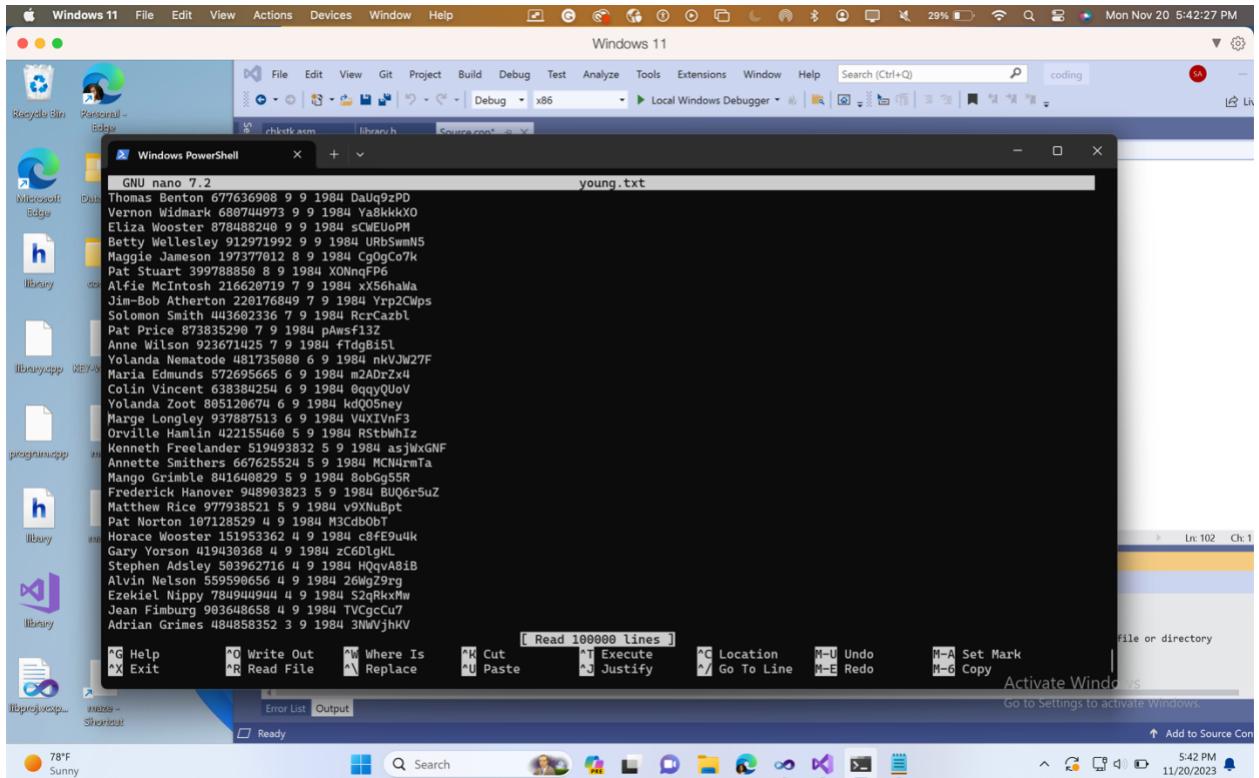
```

const int N = 100000;
info[N].firstname = " ";
info[N].lastname = " ";
info[N].password = " ";
info[N].ssn = 0;
info[N].day = 00;
info[N].month = 00;
info[N].year = 0000;

int pos = 0;
while (true)
{
    in >> info[pos].firstname >> info[pos].lastname >> info[pos].ssn
        >> info[pos].day >> info[pos].month >> info[pos].year
        >> info[pos].password;
    if (in.fail())
        break;
    pos = pos + 1;
}

in.close();
youngest(info, N, 0, N);
int i = 0;
while (i < N)
{
    young << info[i].firstname << " " << info[i].lastname << " " << info[i].ssn << " " <<
info[i].day
    << " " << info[i].month << " " << info[i].year << " " << info[i].password << "\n";
    i = i + 1;
}
}

int main()
{
    Information info[100001];
    readfile(info); }
```



## 9. How Fast Is It?

```
#include <iostream>
#include <iomanip>
#include <fstream>
#include <cmath>
#include <string>
#include <time.h>
#include <sys/resource.h>

using namespace std;

struct Information
{
    string firstname, lastname, password;
    int ssn, day, month, year;
};

double get_cpu_time()
{
    rusage ruse;
    getrusage(RUSAGE_SELF, &ruse);
    return ruse.ru_utime.tv_sec + ruse.ru_utime.tv_usec / 1000000.0 +
        ruse.ru_stime.tv_sec + ruse.ru_stime.tv_usec / 1000000.0;
}
```

```

void swap(Information info[], int first, int pos)
{
    Information x = info[first];
    info[first] = info[pos];
    info[pos] = x;
}

void youngest(Information name[], int length, int v, int last)
{
    double x = get_cpu_time();
    while (v < last)
    {
        Information young = name[last];
        int i = v;
        int pos = 0;
        while (i < length)
        {
            if (young.year < name[i].year)
            {
                young = name[i];
                pos = i;
            }
            if (young.year == name[i].year && young.month < name[i].month)
            {
                young = name[i];
                pos = i;
            }
            if (young.year == name[i].year && young.month == name[i].month &&
young.day <
name[i].day)
            {
                young = name[i];
                pos = i;
            }
            i = i + 1;
        }
        swap(name, v, pos);
        v = v + 1;
    }
    cout << "CPU TIME: " << x << "\n";
}

void readfile(Information info[])
{
    ifstream in;
    in.open("/home/118/database100.txt");
}

```

```

if (in.fail())
{
    cout << "Cannot read the file\n";
    exit(1);
}
ofstream young("young.txt");

const int N = 100000;
info[N].firstname = " ";
info[N].lastname = " ";
info[N].password = " ";
info[N].ssn = 0;
info[N].day = 00;
info[N].month = 00;
info[N].year = 0000;

int pos = 0;
while (true)
{
    in >> info[pos].firstname >> info[pos].lastname >> info[pos].ssn
        >> info[pos].day >> info[pos].month >> info[pos].year
        >> info[pos].password;
    if (in.fail())
        break;
    pos = pos + 1;
}

in.close();
youngest(info, N, 0, N);
int i = 0;
while (i < N)
{
    young << info[i].firstname << " " << info[i].lastname << " " << info[i].ssn << " " <<
    info[i].day
        << " " << info[i].month << " " << info[i].year << " " << info[i].password << "\n";
    i = i + 1;
}
}

int main()
{
    Information info[100001];
    readfile(info);
}

```

A screenshot of a Windows 11 desktop environment running on a Mac. The taskbar at the bottom shows standard Windows icons like File Explorer, Edge, and File Explorer. The system tray indicates it's 5:21 PM on Monday, November 20, 2023, with a battery level of 32%.

The main window is a Visual Studio Code instance titled "Windows PowerShell". It contains C++ code for reading information from a file and printing it to the console. The code includes error handling for stack overflow and missing include files.

```
in >> info[pos].firstname >> info[pos].lastname >> info[pos].ssn  
    >> info[pos].day >> info[pos].month >> info[pos].year  
    >> info[pos].password;  
if (in.fail())  
    break;  
pos = pos + 1;  
}  
  
in.close();  
youngest(info, N, 0, N);  
int i = 0;  
while (i < N)  
{  
    young << info[i].firstname << " " << info[i].lastname << " " << info[i].ssn << " " << info[i].day  
    << " " << info[i].month << " " << info[i].year << " " << info[i].password << "\n";  
    i = i + 1;  
}  
  
int main()  
{  
    Information info[100001];  
    readfile(info);  
}
```

The terminal output shows the program running successfully:

```
sma457@rabbit:~ % a.out  
CPU TIME: 0.078945  
sma457@rabbit:~ |
```

The "Error List" tab in the VS Code interface shows two warnings:

- C6262 Function uses '100000' bytes of stack: exceeds /analyze:stacksize '16384'. Consider moving some data to heap.
- C1083 Cannot open include file: 'sys/resource.h': No such file or directory