**Take Home Program 9 – Due on or before Tuesday 5/14/19**

1. **SortAndSearch.cpp – Objectives: Binary Search and Selection sort**

You are given a list of 20 names as follows:

{"Collins, Bill", "Smith, Bart", "Michalski, Joe", "Griffin, Jim",

"Sanchez, Manny", "Rubin, Sarah", "Taylor, Tyrone", "Johnson, Jill",

"Allison, Jeff", "Moreno, Juan", "Wolfe, Bill", "Whitman, Jean",

"Moretti, Bella", "Wu, Hong", "Patel, Renee", "Harrison, Rose",

"Smith, Cathy", "Conroy, Pat", "Kelly, Sean", "Holland, Beth"};

Write a program to sort and display the names in alphabet order (use selection sort).

The program prompts the user to enter the name being search (use binary search). The program also makes a correction to upper case the first character of the first and last name (see sample output).

**Sample output:**

The names in sorted order are:

Allison, Jeff

Collins, Bill

Conroy, Pat

Griffin, Jim

Harrison, Rose

Holland, Beth

Johnson, Jill

Kelly, Sean

Michalski, Joe

Moreno, Juan

Moretti, Bella

Patel, Renee

Rubin, Sarah

Sanchez, Manny

Smith, Bart

Smith, Cathy

Taylor, Tyrone

Whitman, Jean

Wolfe, Bill

Wu, Hong

Type the name to search (Last name, first name):

haRRIson, rOSe

Harrison, Rose was found in the array.

Another name search? (Y/N) y

Type the name to search (Last name, first name):

keLlY, kAY

Kelly, Kay was NOT found in the array.

Another name search? (Y/N)

**// Function prototypes**

**void displayNames(const string[], int);**

Called by main function; passed the array of names and the number of names. Prints the list of names.

**void selectionSort(string[], int);**

Called by main; passed the array of names and the number of names to sort into alphabetic ascending order.

**string upperCaseIt(const string);**

Called by main; passed a string being search. Convert the first character of the first and last name of the string passed in to uppercase only.

**bool binarySearch(const string[], int, string);**

Called by main function; passed the array of strings, the number of strings, and the string being searched for.

**Pseudocode**

* Setup the array of strings
* Call selectionSort function to sort the strings
* Call displayNames function to display names in order on the screen.
* Prompt user to get the string to be searched
* Call binarySearch function to search for the name in the array
* Call uppserCaseIt function to make correction upper/lower cases in appropriate position and display on the screen.
* Be sure it is in the loop.

**Copy and paste your program (source) code and the outputs after this line**

**++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++**

/\* Erik Gonzalez

CO SCI 575

SortAndSearch.cpp

This program sorts an array of names in alphabetical order,

then asks the user to search for a name in the array

and then the program searches for that name and corrects

any mispelling caused by the user.

\*/

#include <iostream>

#include <string>

#include <cstring>

using namespace std;

void displayNames(const string[], int);

void selectionSort(string[], int);

string upperCaseIt(const string);

bool binarySearch(const string[], int, string);

const int SIZE = 20;

string nameList[SIZE] = {

"Collins, Bill", "Smith, Bart", "Michalski, Joe", "Griffin, Jim",

"Sanchez, Manny", "Rubin, Sarah", "Taylor, Tyrone", "Johnson, Jill",

"Allison, Jeff", "Moreno, Juan", "Wolfe, Bill", "Whitman, Jean",

"Moretti, Bella", "Wu, Hong", "Patel, Renee", "Harrison, Rose",

"Smith, Cathy", "Conroy, Pat", "Kelly, Sean", "Holland, Beth"

};

string inputName;

int main()

{

cout << "The names in sorted order are: " << endl;

selectionSort(nameList, SIZE);

displayNames(nameList, SIZE);

cout << "\nType the name to search (Last name, first name): \n";

getline(cin, inputName);

inputName = upperCaseIt(inputName);

binarySearch(nameList, SIZE, inputName);

string again;

cout << "\nWant to go again? Y\N: ";

cin >> again;

while (again == "Y" || again == "y" || again == "Yes" || again == "yes")

{

cout << "\nType the name to search (Last name, first name): \n";

cin.ignore();

getline(cin, inputName);

inputName = upperCaseIt(inputName);

binarySearch(nameList, SIZE, inputName);

cout << "\nWant to go again? Y\N: ";

cin >> again;

}

//Checks if the user does not want to continue

if (again == "N" || again == "n" || again == "No" || again == "no")

{

system("pause");

return 0;

}

}

//Displays all the names in the array

void displayNames(const string[], int)

{

for (int i = 0; i < SIZE; i++)

{

cout << nameList[i];

cout << endl;

}

}

//Sorts the names in alphabetical order

void selectionSort(string[], int)

{

int startScan, minIndex;

string minValue;

for (startScan = 0; startScan < SIZE; startScan++)

{

minIndex = startScan;

minValue = nameList[startScan];

for (int index = startScan + 1; index < SIZE; index++)

{

if (nameList[index] < minValue)

{

minValue = nameList[index];

minIndex = index;

}

}

nameList[minIndex] = nameList[startScan];

nameList[startScan] = minValue;

}

}

//Searches the array of names to find a match

bool binarySearch(const string[], int, string)

{

int first = 0,

last = SIZE - 1,

middle,

position = -1;

bool found = false;

while (!found && first <= last)

{

middle = (first + last) / 2;

if (nameList[middle] == inputName)

{

found = true;

position = middle;

}

else if (nameList[middle] > inputName)

last = middle - 1;

else

first = middle + 1;

}

if (position >= 0)

cout << inputName << " was found in the array." << endl;

else

cout << inputName << " was NOT found in the array." << endl;

return position;

}

//Converts the string into a cstring by using strcpy and then fixes any errors in the spelling.

/\*Note: When I tried using strcpy, the compiler said this function or variable

may be unsafe and that I should use strcpy\_s instead\*/

string upperCaseIt(const string)

{

char fixedNames[SIZE];

strcpy\_s(fixedNames, inputName.c\_str());

fixedNames[0] = toupper(fixedNames[0]);

for (int i = 1; i < SIZE; i++)

{

if (fixedNames[i - 1] == ' ')

fixedNames[i] = toupper(fixedNames[i]);

else

fixedNames[i] = tolower(fixedNames[i]);

}

return fixedNames;

}

**OUPUTS:**

**The names in sorted order are:**

**Allison, Jeff**

**Collins, Bill**

**Conroy, Pat**

**Griffin, Jim**

**Harrison, Rose**

**Holland, Beth**

**Johnson, Jill**

**Kelly, Sean**

**Michalski, Joe**

**Moreno, Juan**

**Moretti, Bella**

**Patel, Renee**

**Rubin, Sarah**

**Sanchez, Manny**

**Smith, Bart**

**Smith, Cathy**

**Taylor, Tyrone**

**Whitman, Jean**

**Wolfe, Bill**

**Wu, Hong**

**Type the name to search (Last name, first name):**

**whitMan, JEAN**

**Whitman, Jean was found in the array.**

**Want to go again? YN: Y**

**Type the name to search (Last name, first name):**

**eRiK, GonAZalez**

**Erik, Gonazalez was NOT found in the array.**

**Want to go again? YN: N**

**Press any key to continue . . .**