Department of Information Systems and Technologies

CTIS 152 – Data Structures and Algorithms

FALL 2024 - 2025

Lab Guide #11 – Week 8-1

OBJECTIVE : Bubble Sort

Instructors : Burcu LİMAN
Assistants : Berk ÖNDER, Engin Zafer KIRAÇBEDEL

BUBBLE SORT ALGORITHM:

```
1. Repeat
2. Initialize sorted 1
    3. Repeat for each pair of adjacent array elements
    4. If the values in a pair are out of order
       4.1. Exchange the values
       4.2. Set sorted to 0
as long as the array is not sorted
```

Q1. Write a C program that reads the number of pc sold for several labs from the file "**labs.txt"** into an integer array with a **maximum size of 15** and sorts the number of pcs sold using the Bubble Sort algorithm in **ascending order** and displays them on the screen.

Example Run:

```
#of pcs in labs
**************
     20
     25
     26
     27
     30
     33
     35
     36
     45
```

labs.txt

```
36
35
25
20
30
33
45
27
26
```

Project Name: LG11_Q1
File Name: Q1.cpp

Q2. Write a C program that forms a list of movie names by getting from the user until "end" is entered. Each movie will be added to the list and the list should be sorted in **descending order** by using the Bubble Sort algorithm. After sorting, the new form of the list will be displayed on the screen. **Assume that NO duplicate value is given.**

Write the following functions; **`bubbleSort, display`**

Project Name: LG11_Q2
File Name: Q2.cpp

Example Run:

```
Enter a movie(end to stop): The Abyss
Enter a movie(end to stop): Ashes
Enter a movie(end to stop): Einstein and the Bomb
Enter a movie(end to stop): Mea Culpa
Enter a movie(end to stop): Despicable Me3
Enter a movie(end to stop): Top Gun
Enter a movie(end to stop): Allied
Enter a movie(end to stop): The Prince & Me
Enter a movie(end to stop): end

Movie List
------------------------------
1) Top Gun
2) The Prince & Me
3) The Abyss
4) Mea Culpa
5) Einstein and the Bomb
6) Despicable Me3
7) Ashes
8) Allied
```

Q3. Write a C program that reads the unsorted list of seminar information of a department (month, seminar name, participant) from the file **seminars.txt** into a **dynamically** created structure array (the first line of the file consists of the number of seminars) and sorts them according to the participant in **descending** order using the Bubble Sort algorithm and displays the list on the screen.

Write the following functions; **`readFromfile, display, bubbleSort`**

Project Name: LG11_Q3
File Name: Q3.cpp

Example Run:

```
Month    Seminar                                  Participant
-----------------------------------------------------------
March    AI                                          1000
March    Big Data                                     634
February Start-Ups Future                             512
April    ACM Code of Ethics                           413
April    Professional Conduct                         413
February Computer Networks                            125
```

seminars.txt

```
6
March AI 1000
March Big Data 634
February Computer Networks 125
February Start-Ups Future 512
April ACM Code of Ethics 413
April Professional Conduct 413
```

ADDITIONAL QUESTIONS

AQ1.

Write a C program that reads information (**name, surname, and birth year**) for several people from the "**people.txt**" into a structure array, sorts the array according to the **surname** and then the **name** of the person in ascending order using the Bubble Sort algorithm and write the sorted list into the "**sorted.txt**" file.

Write the following function;

- **`bubbleSortTwoLevel`:** that sorts the data according to the **surname** and then the **name** of the person in **ascending** order.

people.txt

```
cem yilmaz 1975
ayla algan 1920
leyla pekhos 1980
ali cengaver 1965
deniz candan 1982
ahmet yilmaz 1979
efe  kirikoz 1968
beyza yilmaz 1965
meric yagci 1980
emirhan durlanik 1966
kerem kaplan 1980
simge yilmaz 1977
ezgi zorkol 1983
ali yilmaz 1966
yunus celik 1966
ali saban 1990
recep ivedik 1974
ilayda kaplan 1992
abdullah karagül 1972
ibrahim palabiyik 1945
emre gungormus 1970
ayten kaplan 1969
```

sorted.txt

```
ayla            algan           1920
deniz           candan          1982
yunus           celik           1966
ali             cengaver        1965
emirhan         durlanik        1966
emre            gungormus       1970
recep           ivedik          1974
ayten           kaplan          1969
ilayda          kaplan          1992
kerem           kaplan          1980
abdullah        karagül         1972
efe             kirikoz         1968
ibrahim         palabiyik       1945
leyla           pekhos          1980
ali             saban           1990
meric           yagci           1980
ahmet           yilmaz          1979
ali             yilmaz          1966
beyza           yilmaz          1965
cem             yilmaz          1975
simge           yilmaz          1977
ezgi            zorkol          1983
```

Project Name: LG11_AQ1
File Name: AQ1.cpp

AQ2.

A company keeps the information of the employees **(ssn, name, surname, gross salary**) and their stoppage details (**Private Health Insurance**: family/individual/none, **otoBES**-Automatic Personal Retirement Insurance: Y/N, **SGK**-Social Insurance Contribution percentage) in the text file **"employee.txt"** and pays their salary according to the following stoppage criteria:

- **Private Health Insurance:** Family 194 TL, Individual 97 TL
- **OtoBES** %3 of gross salary
- **SGK** stoppage is different for each employee and will be calculated out of the gross salary with the specified percentage.

Write a C program that reads all the information from the employee.txt file into an array of structures, sorts the list according to the surname in ascending order, and displays the information of all employees including their net payment after stoppage payments.

Write the following functions deciding the parameters and the return types on your own and test them in main:
`readEmpInfo, calcNetSalary, displayEmpInfo, bubbleSort`

employee.txt

```
111 ali uyar 37000 family Y 25
222 ayse yilmaz 40000 individual N 25
333 zehra engin 60000 none Y 30
444 sena altun 80000 individual Y 30
555 ayla celik 24500 none N 20
666 bartu demirel 78000 family N 30
```

Example Run:

SSN	NAME	SURNAME	Health Ins	BES	SGK	GrossSalary	NET Payment
***	*********	*********	**********	***	***	**********	**********
444	sena	altun	individual	Y	%30	80000.00 TL	53503.00 TL
555	ayla	celik	none	N	%20	24500.00 TL	19600.00 TL
666	bartu	demirel	family	N	%30	78000.00 TL	54406.00 TL
333	zehra	engin	none	Y	%30	60000.00 TL	40200.00 TL
111	ali	uyar	family	Y	%25	37000.00 TL	26446.00 TL
222	ayse	yilmaz	individual	N	%25	40000.00 TL	29903.00 TL

Project Name: LG11_AQ2
File Name: AQ2.cpp