Department of Information Systems and Technologies

CTIS151 – Introduction to Programming

SPRING 2023- 2024

Lab Guide #5 – Week 5 – 2

OBJECTIVES : Nested if statement Selection Structures
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Q1. Write a C program that reads a five digit binary number, converts that number to decimal, then displays the decimal number.

HINT:

$$\underset{\downarrow}{1} \quad \underset{\downarrow}{0} \quad \underset{\downarrow}{1} \quad \underset{\downarrow}{0} \quad \underset{\downarrow}{1}$$

$$1 * 2^4 + 0 * 2^3 + 1 * 2^2 + 0 * 2^1 + 1 * 2^0 = 16 + 0 + 4 + 0 + 1 = 21$$

Example Run #1:

```
Enter a binary number: 11011
Decimal equivalent : 27
```

Example Run #2:

```
Enter a binary number: 11101
Decimal equivalent : 29
```

Example Run #3:

```
Enter a binary number: 00111
Decimal equivalent : 7
```

Project Name: LG5_Q1
File Name: Q1.cpp

Q2. A customer pays the electricity bill which consists of the **base payment**, the **electric charge** and the **distribution charge**. The bill is created according to the following criteria:

Each customer has to pay **100.00** TL base payment for the first 1500 kWh and **0.45** TL for each additional kWh.
The distribution charge is **35%** of the electricity charge.

Write a C program that reads the electricity usage in **kWh** and then computes and displays **electricity charge**, **distribution charge** and the **total electricity bill** as shown in the example run below.

Example Run #1:

```
Enter the electricity usage (in kWh):
1500
Electricity Charge: 100.00 TL
Distribution Cost:  35.00 TL

Total bill is 135.00 TL
```

Example Run #2:

```
Enter the electricity usage (in kWh): 2000
Electricity Charge: 325.00 TL
Distribution Cost: 113.75 TL

Total bill is 438.75 TL
```

Project Name: LG5_Q2
File Name: Q2.cpp

Q3. In a travel agency, there is a trip for KARS (eastern express) city with a train. There are three types of tickets;

- BUSINESS wagon (590 TL unit price),
- PULLMAN wagon (475 TL unit price),
- SLEEPER COMPARTMENT wagon (3100 TL unit price).

Write a C program that gets the number of people for each wagon and then calculates and displays the total price which the agency must pay with the given format.

Example Run #1:

```
Ticket point of sale:
Select wagon type(case sensitive):
B or b: Business
P or p: Pullman
C or c: Compartment
Please enter wagon type:B
Please enter number of passengers: 10
For 10 passengers, the total fee 5900.00 for
B wagon.
```

Example Run #2:

```
Ticket point of sale:
Select wagon type(case sensitive):
B or b: Business
P or p: Pullman
C or c: Compartment
Please enter wagon type:b
Please enter number of passengers: 2
For 2 passengers, the total fee 1180.00 for b
wagon.
```

Example Run #3:

```
Ticket point of sale:
Select wagon type(case sensitive):
B or b: Business
P or p: Pullman
C or c: Compartment
Please enter wagon type:c
Please enter number of passengers: 4
For 4 passengers, the total fee 12400.00 for
c wagon.
```

Example Run #4:

```
Ticket point of sale:
Select wagon type(case sensitive):
B or b: Business
P or p: Pullman
C or c: Compartment
Please enter wagon type:z
Invalid wagon type. Please select B, P or C.
```

Project Name: LG5_Q3
File Name: Q3.cpp

Q4. A coffee shop has special discounts for Cold and Hot products. The discount rates are given below:

Cold coffees 10%,
10% extra discount, if the price is 60 TL and over Hot coffees 25%
20% extra discount, if the hot coffees type is espresso

Write a C program that reads the price and type of a coffee (if the coffee is hot coffee ask if it is espresso), calculates and displays the discounted price for the customer. Please examine the example runs. **Use if statement.**

Example Run #1:

```
Enter coffee type (C/c or H/h): c
Enter price: 55
Discounted price is: 49.50 TL
```

Example Run #2:

```
Enter coffee type (C/c or H/h): c
Enter price: 75
Discounted price is: 60.00 TL
```

Example Run #3:

```
Enter coffee type (C/c or H/h): h
Enter price: 75
Espresso (y/n): y
Discounted price is: 41.25 TL
```

Example Run #4:

```
Enter coffee type (C/c or H/h): H
Enter price: 85
Espresso (y/n): n
Discounted price is: 63.75 TL
```

Project Name: LG5_Q4
File Name: Q4.cpp

Additional Questions

AQ1. Write a program that gets the type and sales of a company, and finds the income of the company according to the following criteria:

Sales	Company Type	Income
>=40.000	Catering (C/c)	$375 + 16% of sales
< 40.000	Catering (C/c)	$350 + 14% of sales
>=25.000	Medical (M/m)	$325 + 12% of sales
<25.000	Medical (M/m)	$300 + 9% of sales

Project Name: LG5_ AQ1
File Name: AQ1.cpp

Example Run #1:

```
Enter the company type (C/c) Catering (M/m) Medical: c
Enter the sales of the company: 30000

Income of the company is $4550.00
```

Example Run #2:

```
Enter the company type (C/c) Catering (M/m) Medical: c
Enter the sales of the company: 50000

Income of the company is $8375.00
```

Example Run #3:

```
Enter the company type (C/c) Catering (M/m) Medical: m
Enter the sales of the company: 10000

Income of the company is $1200.00
```

Example Run #4:

```
Enter the company type (C/c) Catering (M/m) Medical: m
Enter the sales of the company: 50000

Income of the company is $6325.00
```

AQ2. A market gives a chance to win discount on its 10th anniversary. For all customers a number is created between 1 and 5 and according to that number, they get a discount rate for their shopping. Table for the discounts is below.

1	15%
2	35%
3	50%
4	75%
5	80%

Write a C program that gets the bill of the customer and creates a random number between 1 and 5 for the customer. According to the result show the discounted bill as shown in the example run below. (You may find the algorithm for generating random number below)

Project Name: LG5_AQ2
File Name: AQ2.cpp

Example Run #1:

```
Enter your bill: 100

You won 50% discount
Your new bill is 50.00 TL
```

Example Run #2:

```
Enter your bill: 345

You won 15% discount
Your new bill is 293.25 TL
```

Example Run #3:

```
Enter your bill: 200

You won 75% discount
Your new bill is 50.00 TL
```

Example Run #4:

```
Enter your bill: 35

You won 80% discount
Your new bill is 7.00 TL
```

GENERATION OF RANDOM NUMBERS:

1. Use stdlib.h (for srand function)
2. Use time.h (for time function).
3. srand(time(0)); for getting different number every time you run the program.
4. For getting a random number between 0 – 50: num = rand() % 51;
5. Apply debug process to check the random number.

Example program:

```
#include <stdio.h>
#include <stdlib.h> //for srand funtion
#include <time.h>  //for time function

int main(void)
{
   int num;

    /* we use srand function to be able to get a random number but we cannot use the srand function on
   its own, so we also use time function in it to give a start point to the srand function; because time
   is different every time you run the program, the random number will be different also */

   srand(time(NULL));

    /* because time returns a very big number it returns the millisecond value of the hour, so we want
   to get a random number between 0 and 99, we get the modulus 100 of the rand       function */
   num = rand() % 100;

  /* to create a number between a range*/
  //num = rand() % ((Max+1)-Min) + Min


   printf("The random number is: %d", num);

   return 0;
}
```

Example Run #1:

```
The random number is: 99
```

Example Run #2:

```
The random number is: 26
```

INSTRUCTIONS FOR UPLOADING YOUR ANSWERS:

1. **Make sure you have saved all your work** and exit from Microsoft Visual Studio 2017

2. Upon exit, if you hadn't saved already then Visual Studio will notify you to save it automatically; say **yes** to this.

3. Navigate into the directory in which you had created your lab guide solution and reverse click onto the **LG4_Sols** folder in there.

4. From the options menu, hover your mouse cursor over the **7-Zip** option and select "**Add to LG4_sols.zip**" option to archive and compress your solutions folder. Change the name of the resulting archive to your name and surname to the zip file, i.e. **NameSurname.zip**

5. Upload the zip file to the instructor's PC by using your preferred browser;

   – **CTISL1: http://lab1t**

   – **CTISL2: http://lab2t**

6. Inform your assistant that you have completed the upload process.

7. After your assistant's **approval**, delete your files using the "**Clean**" module you can either find in your start menu, the C: drive root folder or download through http://lab1t for Lab1 and http://lab2t for Lab2