Department of Information Systems and Technologies

CTIS151 – Introduction to Programming

Fall 2024- 2025

Lab Guide #08 – Week 6 – 1

OBJECTIVES : Sentinel-controlled repetition (do...while loops), and data validation.

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Q1. a) Write a program that gets a positive integer and validates the input using a while loop. Then display if the number is odd or even.

Project Name: LG8_Q1a
File Name: Q1a.cpp

Example Run#1:

```
Enter a positive integer: -5
-5 is not a positive value!

Enter a positive integer: -4
-4 is not a positive value!

Enter a positive integer: 4
The number is even.
```

Example Run#2:

```
Enter a positive integer: -44
-44 is not a positive value!

Enter a positive integer: -56
-56 is not a positive value!

Enter a positive integer: 3
The number is odd.
```

b) Modify the Q1 part(a) that gets a positive integer value and validates it by using a while loop, then the program computes the following sequence:

Hailstones Problem: For a positive integer **n**, do the following until **n** becomes **1**:

- if **n** is even, change **n** to **n/2**
- if **n** is odd, change **n** to **3*n+1**

Finally, the output should show the result of each calculation and the number of steps as in the example run.

Project Name: LG8_Q1b
File Name: Q1b.cpp

Example Run#1:

```
Enter a positive integer: 17
Next value is 52
Next value is 26
Next value is 13
Next value is 40
Next value is 20
Next value is 10
Next value is 5
Next value is 16
Next value is 8
Next value is 4
Next value is 2
Next value is 1
Number of steps is 12
```

Example Run#2:

```
Enter a positive integer: -6
Enter a positive integer: 3
Next value is 10
Next value is 5
Next value is 16
Next value is 8
Next value is 4
Next value is 2
Next value is 1
Number of steps is 7
```

Q2. Write a C program that gets the value of positive integer ***n*** and double ***x*** and finds the result of the following series.

$$x - \frac{x^3}{2} + \frac{x^5}{4} - \frac{x^7}{6} + \cdots - \frac{x^{2n+1}}{2n}$$

a) Solve by using **pow** function.

Project Name: LG8_Q2a
File Name: Q2a.cpp

b) Solve without using **pow** function.

Project Name: LG8_Q2b
File Name: Q2b.cpp

Example Run#1:
```
Enter a value for n: -2
Enter a value for n: -3
Enter a value for n: 5
Enter x value: 2.36

The result is -1034.83
```

Example Run#2:
```
Enter a value for n: -6
Enter a value for n: 0
Enter a value for n: 6
Enter x value: -1.45

The result is -7.30
```

Example Run#3:
```
Enter a value for n: -3
Enter a value for n: 3
Enter x value: 2.26

The result is -38.96
```

Q3. A GSM operator has an application called **Shake & Win** which offers gifts such as call, internet, and video & music packages to its customers. Each customer can shake up to three times to win.

1: Daily 1 GB Spotify,
2: Weekly 10 GB YouTube,
3: MONTHLY 1000 mins. call package,
4: 1 GB for 12 HOURS

Write a C program that generates a random number (1-4) and displays an appropriate message for the gift. The customer may want to shake again and get another gift. Your program will continue until the customer wants to stop or reaches the maximum number of shakes.

NOTE: Use **do..while** and **switch** statements!

Project Name: LG8_Q3
File Name: Q3.cpp

Example Run #1:
```
Shake & Win ;)
You won MONTHLY 1000 mins. call package

Shake again? (y/n): y

Shake & Win ;)
You won 1 GB for 12 HOURS

Shake again? (y/n): y

Shake & Win ;)
You won MONTHLY 1000 mins. call package
```

Example Run #2:
```
Shake & Win ;)
You won MONTHLY 1000 mins. call package

Shake again? (y/n): y

Shake & Win ;)
You won MONTHLY 1000 mins. call package

Shake again? (y/n): y

Shake & Win ;)
You won WEEKLY 10 GB YouTube
```

Q4. Write a C program to simulate a movie ticket booking system. The program offers three types of tickets:

- **Regular** Ticket **450** TL,
- **VIP** Ticket **900** TL,
- **Child** Ticket (age 6-12: **150** TL, age: **0-5** get **free** tickets).

If the booking is made before the deadline, a **15%** discount is applied. The program displays a menu with the following options:

```
MOVIE TICKET BOOKING
--------------------
1. Regular Ticket
2. VIP Ticket
3. Child Ticket (age 6-12)
4. EXIT
```

The program asks the user to choose a ticket type (1 to 4). For Child Ticket, the program additionally asks for the child's age. If the booking is made before the deadline, the program asks if the booking is done early. The program calculates and displays the booking amount and continues until the user wants to EXIT (choice: 4). Finally, the program displays **the total booking amount** and **the number of tickets** sold with an **early payment** discount.

You may assume that the user enters valid choices for the ticket type (**1-4**) and valid age for a child ticket (**0-12**).

Project Name: LG8_Q3
File Name: Q3.cpp

Example Run:

```
MOVIE TICKET BOOKING
--------------------
1. Regular Ticket
2. VIP Ticket
3. Child Ticket (age 6-12)
4. EXIT
Enter your choice: 1
Regular Ticket
Is the booking done before the deadline? (y/n): y
Booking successful! Payment: 382.50 TL

MOVIE TICKET BOOKING
--------------------
1. Regular Ticket
2. VIP Ticket
3. Child Ticket
4. EXIT
Enter your choice: 1
Regular Ticket
Is the booking done before the deadline? (y/n): n
Booking successful! Payment: 450.00 TL

MOVIE TICKET BOOKING
--------------------
1. Regular Ticket
2. VIP Ticket
3. Child Ticket
4. EXIT
Enter your choice: 2
VIP Ticket
Is the booking done before the deadline? (y/n): n
Booking successful! Payment: 900.00 TL
```

```
MOVIE TICKET BOOKING
--------------------
1. Regular Ticket
2. VIP Ticket
3. Child Ticket
4. EXIT
Enter your choice: 3
CHILD Ticket
Enter age: 7
Is the booking done before the deadline? (y/n): y
Booking successful! Payment: 127.50 TL

MOVIE TICKET BOOKING
--------------------
1. Regular Ticket
2. VIP Ticket
3. Child Ticket
4. EXIT
Enter your choice: 3
CHILD Ticket
Enter age: 2
Free Ticket for children aged 0-5 :)
Booking successful! Payment: 0.00 TL

MOVIE TICKET BOOKING
--------------------
1. Regular Ticket
2. VIP Ticket
3. Child Ticket
4. EXIT
Enter your choice: 4
Total booking amount: 1860.00 TL
No of tickets sold with an early payment discount: 2
```

ADDITIONAL QUESTIONS

AQ1. TRY TO MAKE A DATA VALIDATION for the user's choice and the age of a child;

Modify the **Q4.cpp**; if the user enters an invalid choice, the program will request the ticket type again to obtain the correct input. Additionally, implement data validation for child tickets; the age should be between 0 and 12.

Project Name: LG8_AQ1
File Name: AQ1.cpp

Example Run:

```
MOVIE TICKET BOOKING
--------------------
1. Regular Ticket
2. VIP Ticket
3. Child Ticket (age 6-12)
4. EXIT
Enter your choice: 0
Invalid choice! Please enter a valid option
(1-4): 5
Invalid choice! Please enter a valid option
(1-4): 1
Regular Ticket
Is the booking done before the deadline?
(y/n): n
Booking successful! Payment: 450.00 TL

MOVIE TICKET BOOKING
--------------------
1. Regular Ticket
2. VIP Ticket
3. Child Ticket (age 6-12)
4. EXIT
Enter your choice: 2
VIP Ticket
Is the booking done before the deadline?
(y/n): y
Booking successful! Payment: 765.00 TL

MOVIE TICKET BOOKING
--------------------
1. Regular Ticket
2. VIP Ticket
3. Child Ticket (age 6-12)
4. EXIT
Enter your choice: 3
CHILD Ticket
Enter age: 5
Free Ticket for children aged 0-5 :)
Booking successful! Payment: 0.00 TL
```

```
MOVIE TICKET BOOKING
--------------------
1. Regular Ticket
2. VIP Ticket
3. Child Ticket (age 6-12)
4. EXIT
Enter your choice: 3
CHILD Ticket
Enter age: 6
Is the booking done before the deadline?
(y/n): n
Booking successful! Payment: 150.00 TL

MOVIE TICKET BOOKING
--------------------
1. Regular Ticket
2. VIP Ticket
3. Child Ticket (age 6-12)
4. EXIT
Enter your choice: 3
CHILD Ticket
Enter age: 15
Child Ticket is only valid for ages 6-12.
Booking unsuccessful!

MOVIE TICKET BOOKING
--------------------
1. Regular Ticket
2. VIP Ticket
3. Child Ticket (age 6-12)
4. EXIT
Enter your choice: 4
Total booking amount: 1365.00 TL
No of tickets sold with an early payment
discount:


1
```

AQ2.

a) Write a C program that generates and displays a number between 5 and 15, and draws a left triangle as in example run.

Project Name: LG8_AQ2a
File Name: AQ2a.cpp

Example Run#1:

```
Randomly generated number is: 8
*
**
***
****
*****
******
*******
********
```

Example Run#2:

```
Randomly generated number is: 11
*
**
***
****
*****
******
*******
********
*********
**********
***********
```

b) Now, copy your source code for **part a** and try to modify it in order to draw the right triangle as in the example run.

Project Name: LG8_AQ2b
File Name: AQ2b.cp

Example Run#1:

```
Randomly generated number is: 6
     *
    **
   ***
  ****
 *****
******
```

Example Run#2:

```
Randomly generated number is: 7
      *
     **
    ***
   ****
  *****
 ******
*******
```

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 **LG8_Sols** folder in there.
4. From the options menu, hover your mouse cursor over the **7-Zip** option and select "**Add to LG8_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**
   - **CTISL7: http://lab7t**
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, http://lab2t for Lab2 and http://lab7t for Lab7.