Department of Information Systems and Technologies

CTIS151 – Introduction to Programming

FALL 2024 - 2025

Lab Guide #6 - Week 5 - 1

OBJECTIVES : Nested if and switch statements, Counter-controlled Repetition
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Q1. A software company plans to raise employee salaries based on pre-defined rates for each employee type.

Category	Employee Type	Raise Rate
Intern	I/i	12%
Junior	J/j	19%
Senior	S/s	25%
Manager	M/m	35%
Other types	Any character	9%

Other types of employees will have a 9% raise rate by default.

Write a C program that reads the employee **type** and current **salary** and calculates the final salary using a switch statement based on the table above.

Example Run#1:

```
Enter type of employee: j
Enter the current salary: 45000

Junior employees will have 19.0% raise

Final salary of the employee is: 53550.00 TL
```

Example Run#2:

```
Enter type of employee: I
Enter the current salary: 17000

Interns will have 12.0% raise

Final salary of the employee is: 19040.00 TL
```

Example Run#3:

```
Enter type of employee: O
Enter the current salary: 8500

The employee will have 9.0% raise

Final salary of the employee is: 9265.00 TL
```

Example Run#4:

```
Enter type of employee: m
Enter the current salary: 80000

Managers will have 35.0% raise

Final salary of the employee is: 108000.00 TL
```

Project Name: LG6_Q1
File Name: Q1.cpp

Q2. Write the program code for the number guessing-game ☺

Generate a random number between 1-10, read the user's guess to find the secret number, and display an appropriate message as in the example run. (See the explanation below about the random number generation).

Project Name: LG6_Q2
File Name: Q2.cpp

a) Read a seed value from the user, and send it to **srand** function as a parameter (**`srand(seed)`**).

Example Run:

```
Enter a seed value to test your program: 5

Please guess, the randomly generated number (1-10): 8
You couldn't guess correctly! The number was 5, See you again next time.
```

b) Modify your program and send **time** to **srand** function as a parameter (**`srand(time(NULL))`**).

Example Run#1:

```
Please guess, the randomly generated number (1-10): 4
You couldn't guess correctly! The number was 1, See you again next time.
```

Example Run#2:

```
Please guess, the randomly generated number (1-10): 6
Congratulations! You have guessed the number correctly :)
```

GENERATION OF RANDOM NUMBERS:

1. Use stdlib.h (for srand function)
2. Use time.h (for time function).
3. srand(time(0)); seeds the random number generator, for getting different number every time you run the program.

For getting a random number between 0 – 50: num = rand() % 51;

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 the 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: 78
```

Example Run#2:

```
The random number is: 54
```

Q3.

a) Write a C program that calculates and displays the sum and average of numbers from 1 to 10.

Project Name: LG6_Q3a
File Name: Q3a.cpp

Example Run:

```
The sum of the numbers is 55
The average of the numbers is 5.50
```

b) Modify the source code **Q3a.cpp**, so the program calculates and displays the sum and average of numbers from 1 to n. Get the value positive integer n from the user.

Project Name: LG6_Q3b
File Name: Q3b.cpp

Example Run:

```
Enter a value: 99
The sum of the numbers is 4950
The average of the numbers is 50.00
```

c) Copy the source code of **Q3b.cpp** into a new project and modify it, so the program inputs two positive integer values m and n as a range (assume that m<=n). Your program calculates and displays the sum of the numbers between m to n and their average.

Project Name: LG6_Q3c
File Name: Q3c.cpp

Example Run:

```
Enter a range: 33 44
The sum of the numbers is 462
The average of the numbers is 38.50
```

Q4. In a Restaurant Station, there is a special sale for the academic staff. Write a C program that gets; first staff type, second the lunchtime, and third bill of the lunch from the user, next program makes the discount for each type of staff, and displays the final price of the lunch, according to the following criteria;

- **Bilkent University Staff (B/b)**
  - If their lunch time is between 11:00 – 14:00 a.m., Bilkent staff gets a %20 percent discount.
- **Koc University Staff (O/o)**
  - If their lunch time is between 11:00 – 12:00 a.m., Koc staff gets a %15 percent discount.
- **Sabanci University Staff (H/h)**
  - If their lunch time is between 12:00 – 14:00 a.m., Sabanci staff gets %10 percent discount.
- Other, give a warning message.

Use switch statement where necessary, examine the example run carefully.

Example Run#1:

```
Enter the university you worked for:(Bilkent/B,Koc/K,Sabanci/S):b
Enter your lunch time:13
Enter your bill:335
You are Bilkent University Staff
The final price for the lunch is 268.00
```

Example Run#2:

```
Enter the university you worked for:(Bilkent/B,Koc/K,Sabanci/S):A
Invalid Staff Type!
```

Example Run#3:

```
Enter the university you worked for:(Bilkent/B,Koc/K,Sabanci/S):K
Enter your lunch time:12.30
Enter your bill:295
You are Koc University Staff
The final price for the lunch is 295.00
```

Project Name: LG6_Q4
File Name: Q4.cpp

ADDITIONAL QUESTIONS

AQ1.

For this question, use the table from **Q1** which is identical to this one, but consider the additional "Minimum Performance Rating For Paid Vacation" column.

A software company plans to raise employee salaries based on pre-defined rates for each employee type. Additionally, the company intends to provide paid vacations to employees based on their performance ratings.

Category	Employee Type	Raise Rate	Minimum Performance Rating For Paid Vacation
Intern	I/i	12%	4
Junior	J/j	19%	3
Senior	S/s	25%	2
Manager	M/m	35%	1
Other types	Any character	9%	N/A

Other types of employees will have a 9% raise rate by default. They will NOT earn paid vacation, but their performance rate will be added to their raise rate.

Write a C program that reads the employee **type**, current **salary**, and performance **rating** (0-5), and calculates the final salary. The program also determines whether the employee is eligible for paid vacation using a switch statement based on the table above.

Project Name: LG6_AQ1
File Name: AQ1.cpp

Example Run#1:

```
Enter type of employee (I: Intern, J: Junior, S: Senior, M: Manager): I
Enter the current salary: 19000
Enter performance rating: 2.8

Interns will have 12.0% raise

Final salary of the employee is: 21280.00 TL
```

Example Run#2:

```
Enter type of employee (I: Intern, J: Junior, S: Senior, M: Manager): k
Enter the current salary: 9900
Enter performance rating: 5

The employee will have 14.0% raise

Final salary of the employee is: 11286.00 TL
```

Example Run#3:

```
Enter type of employee (I: Intern, J: Junior, S: Senior, M: Manager): S
Enter the current salary: 55000
Enter performance rating: 3

Senior employees will have 25.0% raise

The senior employee will get paid vacation!
Final salary of the employee is: 68750.00 TL
```

Example Run#4:

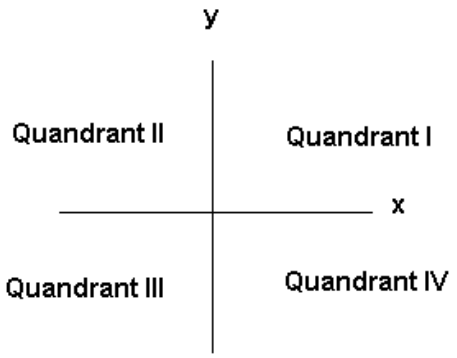
```
Enter type of employee (I: Intern, J: Junior, S: Senior, M: Manager): m
Enter the current salary: 77540
Enter performance rating: 0.3

Managers will have 35.0% raise

Final salary of the employee is: 104679.00 TL
```

AQ2. Write a C program that takes the x-y coordinates of a point in the Cartesian plane and prints the place of the point telling whether it is on an axis, in a certain quadrant, or at the origin.

Project Name: LG6_AQ2
File Name: AQ2.cpp



Example Run #1:

```
Enter x coordinate: 6
Enter y coordinate: -2

(6.0, -2.0) is in the Quadrant IV
```

Example Run #2:

```
Enter x coordinate: -1.7
Enter y coordinate: 3.1

(-1.7, 3.1) is in the Quadrant II
```

Example Run #3:

```
Enter x coordinate: 0
Enter y coordinate: 0

(0.0, 0.0) is at the origin
```

Example Run #4:

```
Enter x coordinate: 0
Enter y coordinate: 1.1

(0.0, 1.1) is on the y axis
```

INSTRUCTIONS FOR UPLOADING YOUR ANSWERS:

1. Make sure you have saved all your work and exit from Microsoft Visual Studio
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 **LG6_Sols** folder in there. (Right-click on the **solution**, then select the '**Open Folder in File Explorer**' option)
4. From the options menu, hover your mouse cursor over the **7-Zip** option and select "**Add to LG6_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. Login to "**CTIS151 Moodle Page**", Find the **LabGuide-06 submission** link for your section, then Upload the zip file.

   E.g. Section 01 students will upload their solutions to: **LabGuide-06 Submission - Sec 01**
6. Inform your assistant that you have completed the upload process.