CSE102 - Introduction to Programming Spring 2024

Assignment #1, Due date: 21/03/2024 Thursday, at 23:59

Note: This assignment effects overall 20% of your final grade. So you should definitely submit this assignment.

1. (10x3=30 pts) Write C programs that print patterns in Figure 1, Figure 2 and Figure 3 separately.
   Note: It is mandatory to use nested loops to generate the patterns.
   All asterisks (*) should be printed by a separate printf() statement.
   Hint: Patterns require adding appropriate number of blank spaces.

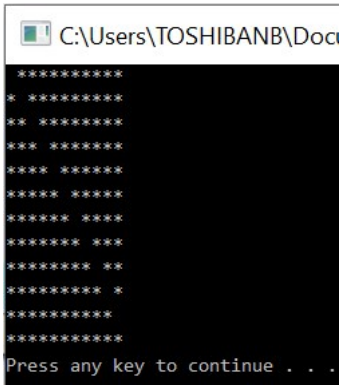

Figure 1. Pattern 1

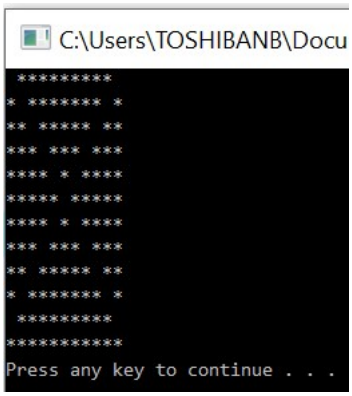

Figure 2. Pattern 2

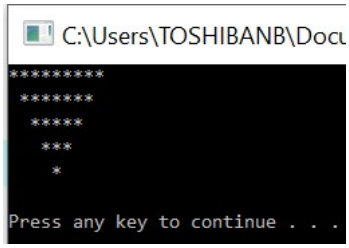

Figure 3. Pattern 3

2. (10 pts) Write a program that takes a positive integer number *n* from the user and prints the numbers from 1 to *n*. Then prints one time left shifted version of the numbers in a new line as shown in Figure 4 and Figure 5.

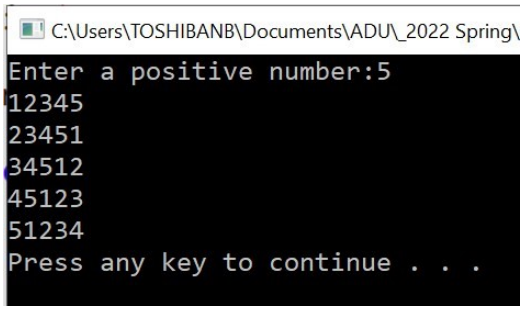

Figure 4. Output while the input number is 5

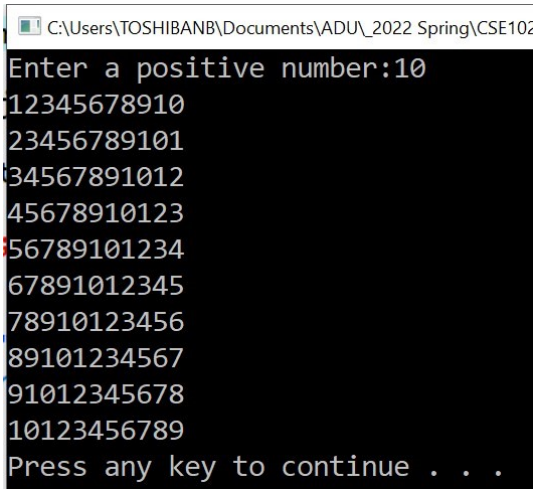

Figure 5. Output while the input number is 10

3. (20 pts) The Open Systems Interconnection model (**OSI model**) is a reference model from the International Organization for Standardization (ISO) that "provides a common basis for the coordination of standards development for the purpose of systems interconnection."

   Write a program that takes the layer number as input from the user and prints out the “layer name” and “layer description” as given in Figure 6.
   Note: Mandatory to use a “switch case” statement.

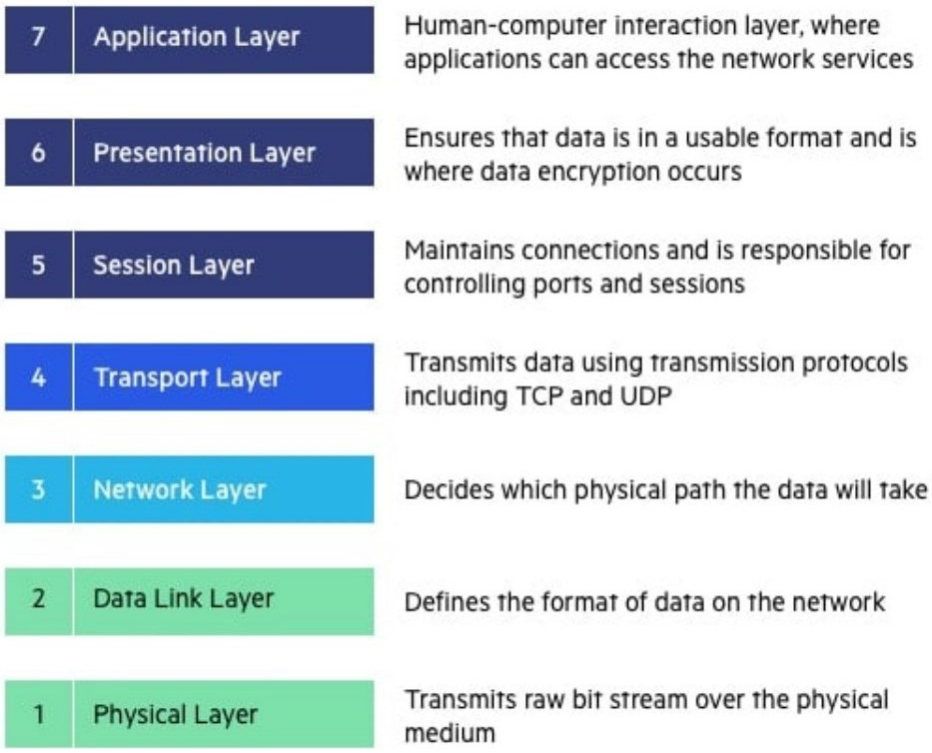

Figure 6: OSI seven layer model, layer ids, layer name and layer descriptions.

4. (20 pts) Write a program that takes 10 integer inputs from the user and finds the second highest number. The second highest number must be printed as output.

   Assume the input numbers are: 20, 42, 571, 15, 54, 2, 6, 107, 94, 82, 75
   Than a sample output may be as follows:

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Second highest number is =107
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5. (20 pts) In computer architecture, **Amdahl's law** is a formula which gives the theoretical speedup in latency of the execution of a task at fixed workload that can be expected of a system whose resources are improved.

$$S_{\text{latency}}(s) = \frac{1}{(1-p) + \frac{p}{s}}$$

Where

s is the speedup of the part of the task that benefits from improved system resources;
p is the proportion of execution time that the part benefiting from improved resources originally occupied.

Write a program that takes positive numbers p and s from the user and then finds the $S_{latency}$(s) according to equation You must print the resulting number as output.

Submission Details

Please send your projects on time. If you submit your project late, you will lose 5 points for each late days. Please keep this in mind and promptly start working on your projects.

You are going to submit the compressed folder in a single zip file via aduzem. Zip file must be named as yournameyoursurname_studentnumber (example→ gozdealp_2007900011.rar or gozdealp_2007900011.zip)

You are required to exhibit an individual effort on this homework. In other word, everyone will send a separate homework for assignment#1. In any forms of copying and cheating all parties will get zero grade from assignment#1.

Good Luck!