

## SWE20004 -Technical Software Development

### Assignment 1

(This assignment is worth 6% of the subject's total assessment marks)

**Due Date: Tuesday 9<sup>th</sup> April 2019 at 11:59 pm**

### Submission instructions

Submit a soft copy of required documents through Canvas.

#### Introduction:

This assignment requires the knowledge of variables, constants, stream input / output, output formatting, assignment statements, expressions as well as the sequence, selection (if/switch statements).

You should complete **all three stages** of the problem. In addition to the answer to assignment question you need to submit **Task 2.10** from week 2, **Task 3.8** from week 3 and **Task 4.8** from week 4.

#### Problem

Assume you are working as a programmer in a communication field. Your task is to alter the original data before transmitting because of a security reason. All of their data is an **integer** that contains the number of digits between two and eight (inclusive), thus the possible integers are between 10 and 99999999. You have to read in an integer and complete the following stages.

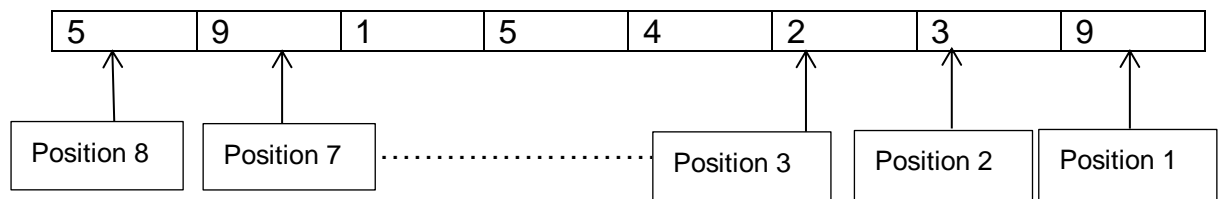
#### Stage 1:

Your task is to modify the data for transmission according to the following set of rules.

1. If the number is a two digit number you swap the positions of the numbers (eg: if the number is 56, altered number is 65).
2. If the number is a three digit number, digits at positions 1 and 3 are swapped. (eg: number is 123, altered number is 321)
3. If the number is four digits or above the following rules apply.

Replace the first digit by the remainder after the sum of that digit plus 1 is divided by 10, the second digit by the remainder after the sum of that digit plus 2 is divided by 10, third digit by the remainder after the sum of that digit plus 3 is divided by 10, fourth digit by the remainder after the sum of that digit plus 4 is divided by 10 and so on.

Position of the number is counted from **right to left**.



**Stage 2: Extra protection** (done only on 8 digits numbers – if the user chooses this option)

Eight digit data contains more valuable information, so you are asked to enable extra protection if the user chooses to.

The extra protection is done on **modified number in stage one** by swapping the digit in position 1 with digit in position 8, digit in position 2 with digit in position 7, digit in position 3 with digit in position 6, digit in position 4 with digit in position 5.

If the modified number in stage 1 is as shown below:

2	3	4	5	6	7	8	9
---	---	---	---	---	---	---	---

The number after stage 2 will look like:

9	8	7	6	5	4	3	2
---	---	---	---	---	---	---	---

### **Stage 3: (Decoding)**

Once the encoding stages are over, write the codes to recover your original data from the encoded data.

#### **Other requirements:**

- This assignment must be written in C++
- Your code must have appropriate header(multiline/block) comments including your name and student number, the name of the .cpp file, the purpose of the program, brief explanations of variables and explanations of any code, which is not obvious to another programmer, summarising the input, output and local variables as well as expressions used in your program and test data.
- Include inline (single-line) comments throughout the program describing important statements.
- Use appropriate and descriptive variable following the naming rules and conventions.
- Write a brief (no more than several pages) report, which illustrates your program design (algorithm or flowchart, identification of variables, constants) and include evidence of testing – screen shots or pasted output text of several tests, and the contents of the .cpp file

- Marks will be allocated depending on the amount of original work submitted. Marks will be deducted for plagiarised and/or un-attributed work.

## Assignment submission:

Submissions through **Canvas** must be made on or before the due date/time.

Each submission should have two files.

1. A report (name of the report should be your student number, eg: 1012546.docx)

This report will be used for plagiarism check using turnitin software. No marks will be given if this report is missing for plagiarism check. Report must (.doc/docx, .pdf or .rtf format – use SWE20004\_AssignmentReportTemplate) contain:

- Description of the problem,
- Description of inputs and outputs,
- A description of the algorithm(s) used in pseudocode or a flowchart
- A copy of the contents of the **.cpp** file
- Pasted **text output** or **screen shots** of the working program resulting from the testing of the program

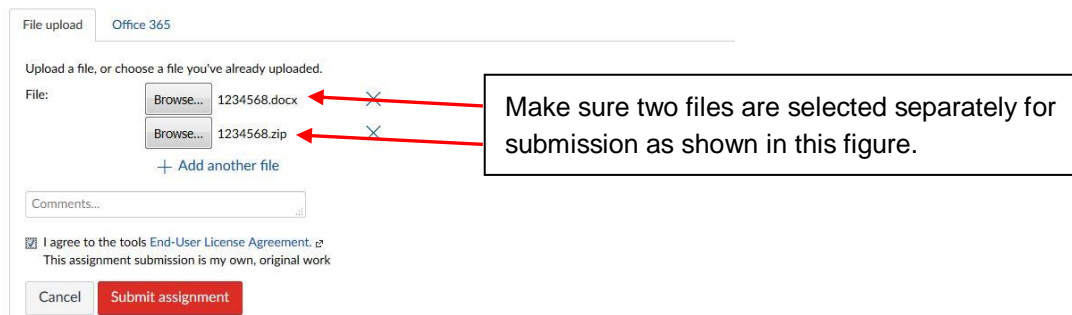
2. A **.zip** file (name of the zip file should be your student number, eg: 1012546.zip) containing:

- a) The actual program (**.cpp** source code) with comments.
  - The name of your **.cpp** file must be **your student number.cpp** (eg. 386123.cpp) for the assignment question.
- b) Task2.3.cpp
- c) Task3.8.cpp
- d) Task4.8.cpp
  - If you are using Visual Studio for this assignment, do not include the solution files, folders or **exe** files.

**Submissions larger than 5 MB will not be accepted.**

### Assignment 1

Due	9 Apr by 23:59	Points	100	Submitting	a file upload	Available	until 14 Apr at 23:59
No Content							



File upload Office 365

Upload a file, or choose a file you've already uploaded.

File:

Browse... 1234568.docx

Browse... 1234568.zip

+ Add another file

Comments...

☒ I agree to the tools End-User License Agreement. This assignment submission is my own, original work

Cancel Submit assignment

Make sure two files are selected separately for submission as shown in this figure.

## Rubrics

Requirement	Weight (%)	Mark awarded
<b>Program specification and design:</b> (1) Specification of what the purpose and functionality of the program is (2) Design presented as pseudocode or flowchart	5	
<b>Documentation:</b> (1) Header comments describing (a) the purpose and function of the program (b) Subject and assignment details (c) personal details of the author. (2) Inline comments where appropriate to describe crucial program statements	5	
<b>Coding:</b> Program includes the following elements in order to meet the requirements <ul style="list-style-type: none"> <li>- Necessary preprocessing directives</li> <li>- Namespace specification</li> <li>- Correct main() function header</li> <li>- Opening and closing braces for the body of main()</li> <li>- Return statement to terminate main() and program</li> <li>- Variable and constant declarations</li> <li>- Input and Output statements</li> <li>- Appropriate use of formatting</li> <li>- Processing including assignment statements, expressions, formulae and calculations as necessary</li> <li>- Appropriate use of sequence, selection</li> <li>- Correct syntax</li> <li>- Correct logic</li> <li>- No runtime errors</li> <li>- Appropriate use of identifier naming rules and conventions</li> <li>- Use of appropriate indentation</li> </ul>	50	
<b>Lab tasks:</b> Task 2.3 from week 2, Task 3.8 from week 3 and Task 4.8 from week 4.	30	
<b>Testing:</b> A sufficient number of appropriate test cases performed and corresponding screen shots provided as evidence	10	
<b>Deductions:</b> Marks will be deducted accordingly for invalid submission of required documents such as missing files, corrupt files, incorrect file formats, use of programming language(s) other than C++ and late or non-submission		
<b>Total Assignment mark (out of 100)</b>	100	
<b>Contribution to unit mark (out of 6)</b>	6	

## Screenshots showing working program:

```
MINGW32:/e/Prince/TSD/assign
Prince@Raji-PC /e/Prince/TSD/assign
$ g++ Assignment1.cpp -o assign1
Prince@Raji-PC /e/Prince/TSD/assign
$ assign1
Enter a number
8
Not a valid input, re enter the number
-10
Not a valid input, re enter the number
67
Number contains 2 digits
The encoded number is 76
The decoded number is 67
```

```
MINGW32:/e/Prince/TSD/assign
Prince@Raji-PC /e/Prince/TSD/assign
$ assign1
Enter a number
230
Number contains 3 digits
The encoded number is 032
The decoded number is 230

Prince@Raji-PC /e/Prince/TSD/assign
$ assign1
Enter a number
200
Number contains 3 digits
The encoded number is 002
The decoded number is 200

Prince@Raji-PC /e/Prince/TSD/assign
$
```

```
MINGW32:/e/Prince/TSD/assign
Prince@Raji-PC /e/Prince/TSD/assign
$ assign1
Enter a number
1234
Number contains 4 digits
The encoded number is 5555
The decoded number is 1234

Prince@Raji-PC /e/Prince/TSD/assign
$ assign1
Enter a number
9876
Number contains 4 digits
The encoded number is 3197
The decoded number is 9876

Prince@Raji-PC /e/Prince/TSD/assign
$ assign1
Enter a number
2345
Number contains 4 digits
The encoded number is 6666
The decoded number is 2345

Prince@Raji-PC /e/Prince/TSD/assign
$
```

```

MINGW32:/e/Prince/TSD/assign
Prince@Raji-PC /e/Prince/TSD/assign
$ assign1
Enter a number
50000
Number contains 5 digits
The encoded number is 04321
The decoded number is 50000
Prince@Raji-PC /e/Prince/TSD/assign
$ assign1
Enter a number
987654
Number contains 6 digits
The encoded number is 531975
The decoded number is 987654
Prince@Raji-PC /e/Prince/TSD/assign
$ assign1
Enter a number
700000
Number contains 6 digits
The encoded number is 354321
The decoded number is 700000
Prince@Raji-PC /e/Prince/TSD/assign
$ assign1
Enter a number
6534562
Number contains 7 digits
The encoded number is 3188883
The decoded number is 6534562
Prince@Raji-PC /e/Prince/TSD/assign
$

```

```

Prince@Raji-PC /e/Prince/TSD/assign
$ assign1
Enter a number
98765432
Number contains 8 digits
Do you want to do second level of encryption, enter yes or no? no
The encoded number is 75319753
The decoded number is 98765432
Prince@Raji-PC /e/Prince/TSD/assign
$ assign1
Enter a number
98765432
Number contains 8 digits
Do you want to do second level of encryption, enter yes or no? yes
The encoded number is 35791357
The decoded number is 98765432
Prince@Raji-PC /e/Prince/TSD/assign
$ assign1
Enter a number
34523450
Number contains 8 digits
Do you want to do second level of encryption, enter yes or no? no
The encoded number is 11177771
The decoded number is 34523450
Prince@Raji-PC /e/Prince/TSD/assign
$ assign1
Enter a number
34523450
Number contains 8 digits
Do you want to do second level of encryption, enter yes or no? yes
The encoded number is 17777111
The decoded number is 34523450
Prince@Raji-PC /e/Prince/TSD/assign
$

```

## Need help?

Talk to your tutor, visit programming Help Desk in ATC620 (8.30 am – 7 pm Monday to Friday)

### TSD Tutors - Help Desk Times:

Syeda: Tuesday 12.30 -1.30 and Friday 10.30 - 1.30 pm

Srikanth: Friday 10.30 -12.30 pm

Sharon: Monday 8:30 - 10:30 am

Kai: Tuesday: 12:30 - 4:30 pm

Michael: Tuesday 2:30 - 4:30, Wednesday 3:30 - 5:30 pm

Gavin: Thursday 12.30 – 2.30 pm

Rida: Thursday 12 - 2 pm