

Candidate Instructions

Assignment - 202 Version 2.1

Create Software Components Using ‘C++’ - Level 2

Assignment 7262-22-202

Create Software Components Using ‘C++’ Level 2

Candidates are advised to read all instructions carefully before starting work and to check with your assessor, if necessary, to ensure that you have fully understood what is required.

You must, at all times, observe all relevant Health and Safety precautions.

Time allowed 4 hours

Introduction

A scenario is provided below for this assignment, which is made up of 3 tasks:

1. Task A provides a detailed design specification that should be followed by candidates when developing their program.
2. Task B provides presentation criteria that should be followed by candidates when producing their work.
3. Task C lists what the candidate should produce for their assessor.

Scenario

Due to climate changes it is necessary to keep a watch on rising sea levels in order that sea defences can be adequately maintained. As an employee of Terrific Software Ltd you have been asked to write a demonstration program, which could be used by data collecting agencies to monitor this problem.

Several years ago a base height for sea levels was determined and is regarded as ‘zero’. Tide height measurements are to be taken in centimetres and recorded to the nearest 20 cm.

Measurements are taken quarterly at high tide and recorded manually. Eventually, this process will form part of your program and be saved to disk. In the meantime, the purpose of your program is to produce a simple graph from the information given.

The graph should include a heading stating the quarter (SPRING, SUMMER, AUTUMN, WINTER) on the ‘y’ axis with the tide height depicted as a bar or other representative output. At the end of the bar should be the actual tide height in centimetres. The ‘x’ axis should include a simple scale in multiples of 10 cm with a numeric indication every 100 cm.

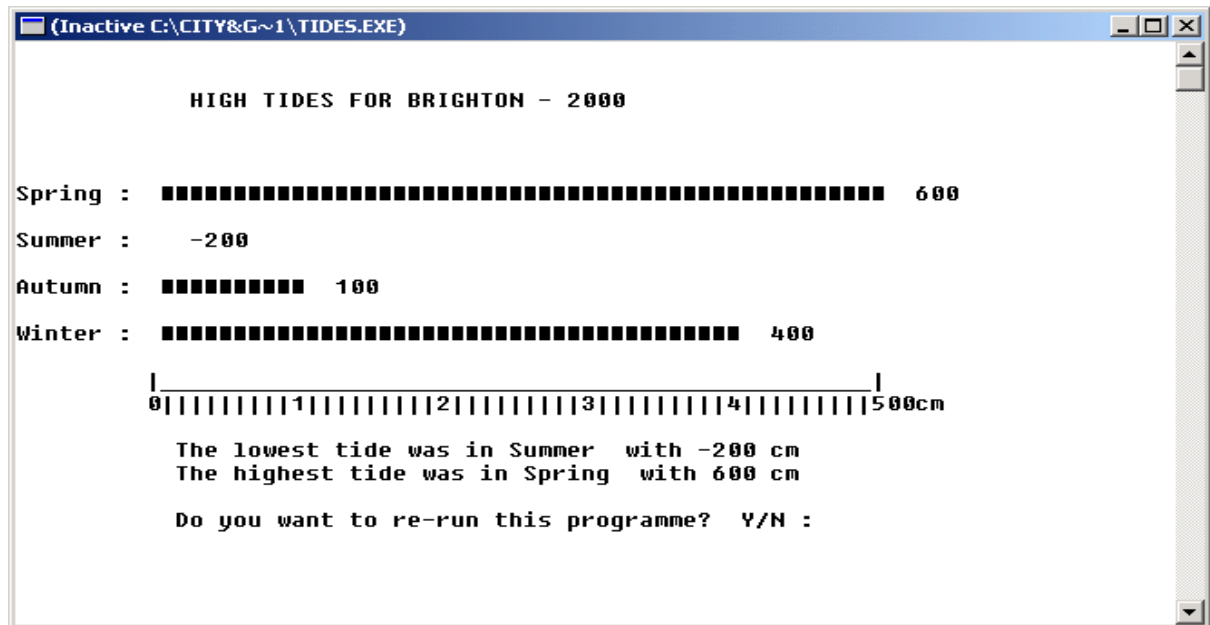
In order to make the graph practical, any tide heights below ‘zero’ will be recorded as ‘zero’ and any heights above 500 cm will be recorded as 500.

Terrific Software has stipulated in its design specification that user input should be validated as an integer number and input as a maximum of a 3-character string. A suitable function should be used to convert the string into an integer number for subsequent range validation.

In addition, in order to make the graph easier to read, it will be necessary to divide the user input by 10 in order to create the graph output. (i.e. an input of 500 will become 50 characters for screen output purposes).

The table/graph must include a simple heading (to include the year) and an indication as to which season had the highest tide and which had the lowest tide level.

The final output could be similar to the following:



Task A

Candidates should use the following detailed specification to fulfil the company's requirements:

1. As part of the specification, the program must be written using functions. Global variables may be declared, but as far as possible, local variables should be used.
2. Details of seasons and tide heights are to be stored in arrays.
3. On executing the program the screen shall clear and a welcome screen displayed with relevant information, from which the operator can gain brief information about the program. There shall be an indication to press any key in order to run the program.
4. On pressing any key the screen shall clear and a request for input of the current year. The screen message should be similar to:

What is the current year? :

5. There must then follow a request for input in turn for each of the seasons. The name of the season is to be recovered from the array as part of output. The screen message should be similar to:

Enter the maximum tide height for *season* in centimetres :

6. Each input shall be validated as a maximum of a 3-digit string. Each character input into the string is to be separately validated in the range of 0 to 9.
7. A suitable conversion function should be used to convert the string into an integer number.

8. An algorithm must determine the following elements:
 - highest tide
 - lowest tide
 - maximum length of graph line
 - minimum length of graph line.
9. On entry of the last season, the screen must clear and the graph displayed. The following information must be displayed on the graph similar to that of the scenario.
 - A title to include the current year.
 - Labels on the ‘y’ axis.
 - A simple scale on the ‘x’ axis range 0 to 50.
 - A simple horizontal bar graph within range of 0 to 50.
 - The actual tide height at the end of each horizontal bar.
 - Details of the lowest tide height including season and measurement.
 - Details of the highest tide including the season and measurement.
10. Below the graph should be a user message offering the option to repeat the program. User input of ‘Y’ shall cause the program to loop and repeat from 5 above.
11. Any other entry shall cause the screen to clear and the program terminate.
12. Test data is to be used to check the actual and expected output of the program.

Task B

Candidates should follow the below criteria when producing their work:

The program conforms to the design specification.

1. The program uses the most appropriate data type(s).
2. Meaning names are used when declaring variables.
3. The most appropriate method is used to read from the keyboard.
4. The syntax is consistently indented to aid readability.
5. The program syntax uses case sensitivity.
6. The program is commented so as to aid understanding of the program.
7. Test data is produced which records expected and actual output from the program.

Task C

Candidates should produce the following for their assessor:

1. A printed program listing.
2. A disk containing the program. The program should be saved under a meaningful name.
3. Test data, which compares expected output with the actual run-time output.

Note

- At the conclusion of this assignment, hand all paperwork and disks to the test supervisor.
- Ensure that your name is on the disk (if using a floppy disk) and all documentation.
- If the assignment is taken over more than one period, all floppy disks and paperwork must be returned to the test supervisor at the end of each sitting.