

Programming Assignment 5

Programming for solving selection problems

Purpose of the exercise

This exercise will help you do the following:

1. Develop familiarity with conditional expressions.
2. Develop skills in C programming with selection statements.

Overview

To enjoy a blissful night's slumber in the outdoor camping, you need the proper gear. This starts with selecting the right sleeping bag.

Sleeping bag choice depends on temperature and humidity conditions. A buyer must select a *bag type* based on the *temperature rating* and its *insulation type* based on *the expected relative humidity* before making a purchase. The guidelines are shown below.

Temperature Guidelines

Bag Type	Temperature Rating (°C)
Summer	+30°C (inclusive) and higher
3-Season	+15°C (inclusive) to +30°C
Winter	Below +15°C

Humidity Guidelines

Insulation Type	Relative Humidity (%)
Synthetic Insulation	Above 40%
Down Insulation	40% (inclusive) and lower

In this assignment, you are to write a function `sleeping_bag()` that takes in a temperature and a humidity level, then computes and prints out a description of the most appropriate sleeping bag.

Inputs

1. *Temperature* - a `signed char` in a valid range: $-50 \leq \text{Temperature} \leq 100$ in degrees Celsius.
2. *Humidity* - an `unsigned char` in a valid range: $0 \leq \text{Humidity} \leq 100$ as a percentage.

Outputs

1. The temperature and humidity.
2. The chosen sleeping bag.
3. An error message "Invalid input!" if either the temperature or humidity level is invalid.

All outputs must be provided as side-effects; the function should return no result.

The following example shows the output related to *Temperature* = 12°C and *Humidity* = 23%.

- ```
1 | The temperature is 12°C, humidity is 23%.
2 | The best sleeping bag is winter type insulated with Down.
```

## Task

1. Download the assignment source code files from *Moodle*. The included files are:
  - - *q.c*
    - *qdriver.c*
    - *out.txt*
2. Using the Microsoft Windows command prompt navigate to the *sandbox* folder. Then type `ws1` to open Linux bash in the same current directory.
3. From Linux open *q.c* in [Microsoft Visual Studio Code](#):

```
1 | code q.c
```

4. Begin editing by formatting the file-level documentation at the top of the source file *q.c*. Make modifications to the template by replacing `@todo` with your information. Providing file-level documentation is mandatory for any submissions in this course.
5. Think about the solution and implement the function `sleeping_bag()` in file *q.c*.

```
1 | #include <stdio.h> // printf
2 |
3 | void sleeping_bag(signed char temperature, unsigned char humidity)
4 | {
5 | // TODO: Complete the code
6 | }
```

Do not forget to save the source file after editing!

You will **not** submit *qdriver.c*; any changes you make to it will not be seen during grading.

6. Add the function-level documentation right before the function definition. Providing function-level documentation is mandatory for all functions for all submissions in this course.
7. Compile and link the source file *q.c* together with *qdriver.c*:

```
1 | gcc -Wall -Wextra -Werror -Wconversion -Wstrict-prototypes -pedantic-
 | errors -std=c11 qdriver.c q.c -o main
```

If the compilation succeeded, you should see the executable file appear in the directory. If you made any mistakes in the code, the compiler will print out a list of errors and warnings that need to be fixed.

8. Run the executable *main* and redirect the output to a file *myout.txt*:

```
1 | ./main > myout.txt
```

9. The given file *out.txt* contains the expected output. Your output, which was redirected into a file *myout.txt*, must **exactly** match the contents of *out.txt*. Use the `diff` command in the Linux bash shell to compare your implementation's actual output with the expected output provided to you, like this:

```
1 | diff --strip-trailing-cr -y --suppress-common-lines myout.txt out.txt
```

## Submitting the deliverables

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You have to upload a complete file *q.c* to *Moodle* - DigiPen (Singapore) online learning management system, where the file will be automatically evaluated.