Lab # 9

November 24, 2016

Task 1: Rewrite the following program by replacing the `switch` statement with a nested `if…else` statement; be careful to deal with the default case properly. This exercise demonstrates that `switch` is a convenience and that any `switch` statement can be written with double-selection and single-selection statements. **(5 marks)**

```
1  // Fig. 4.7: fig04_07.c
2  // Counting letter grades with switch.
3  #include <stdio.h>
4
5  // function main begins program execution
6  int main( void )
7  {
8     int grade; // one grade
9     unsigned int aCount = 0; // number of As
10    unsigned int bCount = 0; // number of Bs
11    unsigned int cCount = 0; // number of Cs
12    unsigned int dCount = 0; // number of Ds
13    unsigned int fCount = 0; // number of Fs
14
15    puts( "Enter the letter grades." );
16    puts( "Enter the EOF character to end input." );
17
18    // loop until user types end-of-file key sequence
19    while ( ( grade = getchar() ) != EOF ) {
20
21       // determine which grade was input
22       switch ( grade ) { // switch nested in while
23
24          case 'A': // grade was uppercase A
25          case 'a': // or lowercase a
26             ++aCount; // increment aCount
27             break; // necessary to exit switch
28
29          case 'B': // grade was uppercase B
30          case 'b': // or lowercase b
31             ++bCount; // increment bCount
32             break; // exit switch
33
34          case 'C': // grade was uppercase C
35          case 'c': // or lowercase c
36             ++cCount; // increment cCount
37             break; // exit switch
38
39          case 'D': // grade was uppercase D
40          case 'd': // or lowercase d
41             ++dCount; // increment dCount
42             break; // exit switch
43
44          case 'F': // grade was uppercase F
45          case 'f': // or lowercase f
46             ++fCount; // increment fCount
47             break; // exit switch
48
```

Fig. 4.7 | Counting letter grades with `switch`. (Part 1 of 2.)

```
49          case '\n': // ignore newlines,
50          case '\t': // tabs,
51          case ' ': // and spaces in input
52             break; // exit switch
53
54          default: // catch all other characters
55             printf( "%s", "Incorrect letter grade entered." );
56             puts( " Enter a new grade." );
57             break; // optional; will exit switch anyway
58       } // end switch
59    } // end while
60
61    // output summary of results
62    puts( "\nTotals for each letter grade are:" );
63    printf( "A: %u\n", aCount ); // display number of A grades
64    printf( "B: %u\n", bCount ); // display number of B grades
65    printf( "C: %u\n", cCount ); // display number of C grades
66    printf( "D: %u\n", dCount ); // display number of D grades
67    printf( "F: %u\n", fCount ); // display number of F grades
68 } // end function main
```

Task 2: A person invests rupees 1000.00 in a savings account with 5% annual profit (i.e., interest rate). Assuming that all the interest is calculated on the deposit in the account, calculate and print the total amount of money in the account at the end of each year for 10 years. Use the following formula for determining these amounts: **(5 marks)**

$$a = p(1 + r)^n$$

Where,

p is the original amount invested (i.e., the principal)

r is the annual interest rate

n is the number of years

a is the amount on deposit at the end of the nth year.

Create a program which prompts its user to enter the principal and valid interest rate (1%, 2%, 3%, 4%, 5%, 6%, 7%, 8%, 9%, and 10%) until a sentinel value is input. Use `do…while` and `switch` control statements appropriately.

The program should display the information like this:

```
Enter the principal: 1000
Enter the interest rate: 5
Year      Amount on deposit (with 5% interest rate)
   1                1050.00
   2                1102.50
   3                1157.63
   4                1215.51
   5                1276.28
   6                1340.10
   7                1407.10
   8                1477.46
   9                1551.33
  10                1628.89

Enter the principal: 5000
Enter the interest rate: 6
Year      Amount on deposit (with 6% interest rate)
   1                  ---
   2                  ---
```

Grading and LMS Submission

- Make sure that the lab engineer has graded your programs until 5 pm.
- You've uploaded the C source files in Zip format over LMS until 5:30 pm.