16.216: ECE Application Programming

Fall 2011

Lecture 9: Programming Exercise 1
September 23, 2011

In today's exercise, we'll complete the following program:

```
/*
 * 16.216: ECE Application Programming, University of Massachusetts Lowell
 * Instructor: Dr. Michael Geiger
 *
 * 9/23/11: Programming Exercise 1
 * Program is intended to give students practice with output formatting
 *   as well as experience using debugger
 *
 * Given: a simple resistive DC voltage divider consisting of a 10V source and
 *   two resistors, one of which is known to be 1000 ohms.
 * Program should read four possible values for the second resistor (max: 5000
 *   ohms) and calculate what the following quantities would be if each value
 *   was used in the divider:
 *      --> The voltage drop across the second resistor
 *      --> The current flowing through the second resistor
 *      --> The power dissipated by the second resistor
 * Program should prompt user to enter desired precision for all data, then
 *   print data in tabular form.
 */

/* EACH COMMENT IN THE MAIN PROGRAM BELOW DESCRIBES A CODE SNIPPET THAT
   STUDENTS MUST WRITE IN ORDER TO COMPLETE THE PROGRAM BELOW. */
int main() {

      /* VARIABLE DECLARATIONS */

      /* PROMPT USER TO ENTER FOUR INTEGER VALUES THAT REPRESENT FOUR
         POSSIBLE RESISTORS TO BE USED IN DIVIDER AND READ THESE VALUES
         ASSUME MAXIMUM RESISTANCE IS 5000 OHMS */

      /* PROMPT USER TO ENTER A DESIRED PRECISION FOR VOLTAGE, CURRENT,
         AND POWER (USE SAME PRECISION FOR ALL THREE) AND READ THIS VALUE */

      /* PRINT A TABLE WITH FOUR ROWS:
          --FIRST ROW: FOUR RESISTANCE VALUES
          --SECOND ROW: VOLTAGE DROP ACROSS RESISTOR, GIVEN EACH VALUE
          --THIRD ROW: CURRENT FLOWING THROUGH RESISTOR, GIVEN EACH VALUE
          --FOURTH ROW: POWER DISSIPATED BY RESISTOR, GIVEN EACH VALUE
         ENSURE THERE ARE AT LEAST TWO SPACES BETWEEN ALL VALUES IN ROW */

      return 0;
}
```

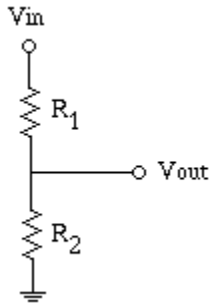

Figure 1: Voltage divider; in our circuit, V_{in} = 10 V, R_1 = 1000 Ω, and R_2 is input-dependent

Use this space to answer the following questions:

- ➔ What variables are necessary?
- ➔ How do we calculate the necessary output values?
- ➔ How do we determine the field widths to be used when printing the table?

Additional work space for the following questions:

- ➔ What variables are necessary?
- ➔ How do we calculate the necessary output values?
- ➔ How do we determine the field widths to be used when printing the table?

Use the following space to hand-write your code (if necessary); fill in the appropriate code below each comment:

```
/* VARIABLE DECLARATIONS */
```

```
/* PROMPT USER TO ENTER FOUR INTEGER VALUES THAT REPRESENT FOUR
   POSSIBLE RESISTORS TO BE USED IN DIVIDER AND READ THESE VALUES
   ASSUME MAXIMUM RESISTANCE IS 5000 OHMS */
```

```
/* PROMPT USER TO ENTER A DESIRED PRECISION FOR VOLTAGE, CURRENT,
   AND POWER (USE SAME PRECISION FOR ALL THREE) AND READ THIS VALUE */
```

```
/* PRINT A TABLE WITH FOUR ROWS:
    --FIRST ROW: FOUR RESISTANCE VALUES
    --SECOND ROW: VOLTAGE DROP ACROSS RESISTOR, GIVEN EACH VALUE
    --THIRD ROW: CURRENT FLOWING THROUGH RESISTOR, GIVEN EACH VALUE
    --FOURTH ROW: POWER DISSIPATED BY RESISTOR, GIVEN EACH VALUE
   ENSURE THERE ARE AT LEAST TWO SPACES BETWEEN ALL VALUES IN ROW */
```

This exercise also introduces you to the debugger; use the space below to describe:

- ➔ The use of breakpoints
- ➔ The point of commands like “Step Over”, “Step Into”, and “Step Out”
- ➔ The different options you can use to view variable values during debugging.