16.216: ECE Application Programming

Summer 2013

Lecture 3: Key Questions

July 16, 2013

1. Explain how to set the field width, alignment, and padding characters for values printed using `printf()`.

2. Explain how to set the precision of a value printed using `printf()`, and what the precision means for the different data types.

3. **Example:** Assume `int x = 123; float y = 4.56; double z = 7.89991;`
   What does each of the following lines print?

a. `printf("%4d %5f %6lf\n", x, y, z);`

b. `printf("%.4d %.4f %.4lf\n", x, y, z);`

c. `printf("%08d %-7.1f %+-4.1lf !\n", x, y, z);`

4. **Example:** Write a short code sequence to do each of the following:

a. Print three integers—x, y, and z

- Use field widths of 10, 20, and 30, respectively
- Put an extra space between each field
- Show the signs of all values and left justify them

b. Print four doubles—d1, d2, d3, d4

- Use field widths of 7 for all values
- Put an extra space between each field
- Show 1, 2, 3, and 4 places after the decimal point, respectively

c. Given three variables—int w, p; double var;

- Read values for w and p from the input
- Print var using field width w and precision p

5. Explain the basic form of an `if` statement.

6. Describe how the expression in `if (<expression>)` is evaluated and show how conditions are evaluated, including multiple conditions in the same expression.

7. Describe how the statement—the actual code to be executed if the condition is true—is written for an `if` statement.

8. Show how multiple if statements can be nested together (`if/else if/else`).

9. **Example:** What does the following code print?

```
int main() {
    int x = 3;
    int y = 7;

    if (x > 2)
        x = x - 2;
    else
        x = x + 2;

    if ((y % 2) == 1)
    {
        y = -x;
        if ((x != 0) && (y != -1))
           y = 0;
    }
    printf("x = %d, y = %d\n", x, y);
    return 0;
}
```

10. Discuss how to use `if` statements to check that a value falls within a desired range.

11. **Example:** Write a short code sequence that does each of the following:

a. Given `int x`, check its value. If `x` is more than 5 and less than or equal to 10, print `x`

b. Prompt for and read temperature as input (type `double`). If temp is 90 or higher, print "It's too hot!" If temp is 32 or lower, print "It's freezing!" In all other cases, print "It's okay"

c. Read 3 `int` values and print error if input problem

- If fewer than 3 values read, print error message with number of values
- Example: `Error: only 2 inputs read correctly`

12. Describe the basic format of a `switch` statement, including its general usage, the use of `case` and `default`, and the use of the `break` statement.

13. Describe a situation in which you might not want to use a `break` statement at the end of a given `case`.

14. **<u>Example:</u>** Given the code below:

```
int main() {
      char grd;

      printf("Enter Letter Grade: ");
      scanf("%c",&grd);
      printf("You are ");

      switch (grd)      {
      case 'A' :
            printf("excellent\n");
            break;
      case 'B' :
            printf("good\n");
            break;
      case 'C' :
            printf("average\n");
            break;
      case 'D' :
            printf("poor\n");
            break;
      case 'F' :
            printf("failing\n");
            break;
      default :
            printf("incapable of reading directions\n");
            break;
      }
      return 0;
}
```

What does the program print if the user inputs:

a. A

b. B+

c. c

d. X

15. How could we easily change each case to recognize both upper and lowercase inputs?

Today’s exercise involves the following code:

```
/* 16.216: ECE Application Programming, University of Massachusetts Lowell
 * Instructor: Dr. Michael Geiger
 * 9/30/11: Programming Exercise 2
 * Program is intended to give students practice with if and switch statements
 *
 * Given: a (fictional) schedule of classes for each day of the week, as
 *   well as a list of holidays during the semester, prompt the user to enter
 *   a day and date, and then print the appropriate schedule for that day. */

// Daily class schedules
#define MonSchedule "Monday Schedule: 16.201, 92.231\n"
#define WedFriSchedule "Wednesday/Friday Schedule: 16.201, 92.231, 16.216\n"
#define TueSchedule "Tuesday Schedule: 16.207, 99.999\n"
#define ThuSchedule "Thursday Schedule: 99.999\n"

// Day of week
#define Monday 'M'
#define Tuesday 'T'
#define Wednesday 'W'
#define Thursday 'R'
#define Friday 'F'

// Month number
#define Sep 9
#define Oct 10
#define Nov 11
#define Dec 12

// Holidays
#define LaborDay 5
#define LaborSchedule "Labor Day -- no classes\n"
#define ColumbusDay 10
#define ColumbusSchedule "Columbus Day -- no classes\n"
#define VeteransDay 11
#define VeteransSchedule "Veterans Day -- no classes\n"
#define ThanksgivingDay 24
#define ThanksgivingSchedule "Thanksgiving Recess -- no classes\n"

/* 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 THE FOLLOWING:
          --A SINGLE CHARACTER REPRESENTING THE DAY OF THE WEEK
          --AN INTEGER REPRESENTING THE MONTH
          --AN INTEGER REPRESENTING THE DAY OF THE MONTH */

       /* PRINT THE APPROPRIATE SCHEDULE FOR THE DAY ENTERED,
          INCLUDING EACH HOLIDAY'S SCHEDULE WHEN APPROPRIATE */

       return 0;
}
```

Use this space to answer the following questions:

- ➔ What variables are necessary?
- ➔ How should you determine what to print:
  - For most days?
  - For the holidays?

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 THE FOLLOWING:
   --A SINGLE CHARACTER REPRESENTING THE DAY OF THE WEEK
   --AN INTEGER REPRESENTING THE MONTH
   --AN INTEGER REPRESENTING THE DAY OF THE MONTH */
```

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

```
/* PRINT THE APPROPRIATE SCHEDULE FOR THE DAY ENTERED,
   INCLUDING EACH HOLIDAY'S SCHEDULE WHEN APPROPRIATE */
```