The switch statement

- **Decision statement: switch statement**

Used when it is necessary to make decision between many alternatives of integral values

- Basic syntax:

```
switch (expression)
{
    case constant-1:  statement
                      …
                      statement
    case constant-2:  statement
                      …
                      statement
    …
    case constant-n:  statement
                      …
                      statement
    default:          statement
                      …
                      statement
}
```

Notes:
(1) Expression should always evaluate to be a value of integral type (e.g., int, char)
In most cases, the expression consists of a single identifier of integral type
(2) The expression followed by each case label must be a constant expression
(3) No two case labels may have the same name
(4) Two case labels may be associated with the same statements
(5) Default case is optional. Statements in default case are executed when none of the case labels were matched. One switch statement can have at most one default case.
(6) Each case acts as an entry point for program execution, all statements below the matched entry point will be executed, unless a break statement is encountered.

Example 1

```
int  value;
cin >> value;

switch (value)
{
   case 5:    cout << "55555" << endl;
   case 4:    cout << " 4444"  << endl;
   case 3:    cout << "  333"   << endl;
   case 2:    cout << "   22"     << endl;
   case 1:    cout << "    1"      << endl;
   default:   cout << "    *"      << endl;
}
```

what will be the output if the input from user is 4? 2? 0?
What if we only want to execute one of the cases?

- **break statement**: cause the program execution to jump out of the switch statement and go to the closing brace, and continue with the code that follows the switch.

Basic syntax:

```
break;
```

Determine the life expectancy of a light bulb

```
int watts, life;
cin >> watts;

switch (watts)
{
   case 25:   life = 2500;
              break;
   case 40:
   case 60:   life = 1000;
              break;
   case 75:
   case 100:  life = 750;
              break;
   default:   life = 0;
              break;
}
```

calculate the letter grade for a score

```
char  grade;
int     temp;
int     score;

cin >> score;
temp = score / 10;
switch (temp)
{
    case  10:
    case   9 :   grade = 'A';
                 break;
    case   8 :   grade = 'B';
                 break;
    case   7 :   grade = 'C';
                 break;
    case   6 :   grade = 'D';
                 break;
    default:     grade = 'F';
                 break;
}

cout  << "The grade for score " << score <<
" is " << grade << endl;
```

Practice question : use switch statement to write a C++ function **ComputeWaterBill** that will calculate and return the amount of the water bill for a customer whose type is 'H' for home use, 'C' for commercial use, and 'I' for industrial use. The rates are as follows:

Type	Rate
H	$5.00 plus 0.0005 per gallon water used
C	$1000.00 for first 4 million gallons and $0.00025 per additional gallon
I	$1000.00 if usage is 4 million gallons or less; $2000.00 for usage over 4 million but less than 10 million gallons; and $3500.00 for use of 10 million or more gallons

Return a value of -1 if there is an error in the input arguments (e.g., an illegal type or a negative usage.)