Selection Control Structures in C++ (switch Structure)

Objectives of the Lecture
- switch Structures
- Avoiding Bugs by Avoiding Partially Understood Concepts and Techniques: Revisited
- Example 1 & Example 2

switch Structures

- switch structure: alternate to if-else
- switch (integral) expression is evaluated first
- Value of the expression determines which corresponding action is taken
- Expression is sometimes called the selector

```c
switch (expression) {
    case value1:
        statements1
        break;
    case value2:
        statements2
        break;
    .
    .
    .
    case valuen:
        statementsn
        break;
    default:
        statements
}
```
- One or more statements may follow a case label.
- Braces are not needed to turn multiple statements into a single compound statement.
- The break statement may or may not appear after each statement.
- switch, case, break, and default are reserved words.

**EXAMPLE 4-21**

Consider the following statements, in which grade is a variable of type char.

```cpp
switch (grade)
{
    case 'A':
        cout << "The grade point is 4.0.";
        break;
    case 'B':
        cout << "The grade point is 3.0.";
        break;
    case 'C':
        cout << "The grade point is 2.0.";
        break;
    case 'D':
        cout << "The grade point is 1.0.";
        break;
    case 'F':
        cout << "The grade point is 0.0.";
        break;
    default:
        cout << "The grade is invalid.";
}
```

In this example, the expression in the `switch` statement is a variable identifier. The variable `grade` is of type `char`, which is an integral type. The possible values of `grade` are 'A', 'B', 'C', 'D', and 'F'. Each `case` label specifies a different action to take, depending on the value of `grade`. If the value of `grade` is 'A', the output is:

The grade point is 4.0.

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**Avoiding Bugs by Avoiding Partially Understood Concepts and Techniques: Revisited**

- To output results correctly

**The switch structure must include a break statement after each cout statement**
Example 1

//Program: Effect of break statements in a switch structure
#include <iostream>
using namespace std;
int main()
{
    int num;
    cout << "Enter an integer between 0 and 7: ";    //Line 1
    cin >> num;                                       //Line 2
    cout << endl;                                      //Line 3
    cout << "The number you entered is " << num       //Line 4
         << endl;
    switch(num)                                        //Line 5
    {
        case 0:                                            //Line 6
        case 1:                                            //Line 7
            cout << "Learning to use ";                    //Line 8
        case 2:                                            //Line 9
            cout << "C++'s ";                              //Line 10
        case 3:                                            //Line 11
            cout << "switch structure." << endl;           //Line 12
            break;                                         //Line 13
        case 4:                                            //Line 14
            break;                                         //Line 15
        case 5:                                            //Line 16
            cout << "This program shows the effect ";      //Line 17
        case 6:                                            //Line 18
        case 7:                                            //Line 19
            cout << "of the break statement." << endl;    //Line 20
            break;                                         //Line 21
        default:                                           //Line 22
            cout << "The number is out of range." << endl; //Line 23
    }
    cout << "Out of the switch structure." << endl;     //Line 24
    return 0;                                          //Line 25
}
Example 2

// Grade program with bugs.
#include <iostream>   // Line 1
using namespace std; // Line 2
int main()          // Line 3
{                   // Line 4
    int testScore;  // Line 5

    cout << "Enter the test score: "; // Line 6
    cin >> testScore;               // Line 7
    cout << endl;                   // Line 8
    switch (testScore / 10)         // Line 9
    {                               // Line 10
        case 0:                     // Line 11
            case 1:                    // Line 12
                case 2:                 // Line 13
                    case 3:                 // Line 14
                        case 4:                 // Line 15
                            case 5:                 // Line 16
                                cout << "The grade is F." << endl;  // Line 17
                                cout << "The grade is D." << endl;  // Line 18
                                cout << "The grade is C." << endl;  // Line 19
                                cout << "The grade is B." << endl;  // Line 20
                                cout << "The grade is A." << endl;  // Line 21
                            default:                  // Line 22
                                cout << "Invalid test score." << endl;  // Line 23
                        default:                  // Line 24
                    default:                 // Line 25
                default:                  // Line 26
            default:                   // Line 27
        default:                   // Line 28
    }                           // Line 29
    return 0;                   // Line 30
}                               // Line 31