

Multiway Decisions

Lecture 11
Sections 4.2 - 4.6

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1 Multi-way Decisions

2 The `switch` Statement

3 Assignment

Outline

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Multi-Way Decisions

- `if` statements may be nested to allow the programmer to make multi-way decisions.
- The false action of each `if` statement is itself an `if` statement.
- Thus, if the first boolean expression is false, the program tests the second boolean expression, and so on.

Multi-Way Decisions

The **if** Statement

```
if (boolean-expression-1)
{
    true-action-1
}
else if (boolean-expression-2)
{
    true-action-2
}
    ⋮
else if (boolean-expression-n)
{
    true-action-n
}
else
{
    false-action
}
```

Multi-Way Decisions

- The boolean expressions are tested sequentially until one of them is found to be true, or until they all are found to be false.
- When one is found to be true, its *true-action* is performed and the remainder of the structure is skipped.

Multi-Way Decisions

- If all of the boolean expressions are found to be false, then the false-action (the “else” part) is performed.
- The final “else” part is optional.
- If the final else part is omitted and all the boolean expressions are found to be false, then no action is performed.

Example of a Multi-way `if` Statement

Example

```
if (score >= 90)
    grade = 'A';
else if (score >= 80)
    grade = 'B';
else if (score >= 70)
    grade = 'C';
else if (score >= 60)
    grade = 'D';
else
    grade = 'F';
```


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The **switch** Statement

- The **switch** statement allows the programmer to make a decision based on the value of an integer-valued expression.
- The value of the expression is computed.
- Then execution branches to one of several cases, depending on that value.

The **switch** Statement

The **switch** Statement

```
switch (integer-valued-expression)  
{  
    case value-1:  
        action-1  
    case value-2:  
        action-2  
        ⋮  
    case value-n:  
        action-n  
    default:  
        default-action  
}
```

The `switch` Statement

- The *integer-valued-expression* must be of one of the types `bool`, `char`, `short`, `int`, `long`, or `long long`.
- *action-i* is performed if the value of the expression matches *value-i*.
- The default part is optional.
- If the value fails to match any case value, then the *default-action* is performed, if there is one.

The **switch** Statement

- Normally, each action ends with a **break** statement.
- The **break** statement causes execution to exit the **switch** structure.
- In the absence of a **break** statement, execution will drop through to the next action part.

The **switch** Statement

The **switch** Statement

```
switch (integer-valued-expression)  
{  
    case value-1:  
        action-1  
        break;  
    case value-2:  
        action-2  
        break;  
        ⋮  
    case value-n:  
        action-n  
        break;  
    default:  
        default-action  
}
```

The `switch` Statement

- The individual case actions do not require braces.
- However, if any variable is declared within the case, then the braces are required.

Example of a **switch** Statement

- Example

- `ComputeGradeEquivalent.cpp`

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- Read Sections 4.2 - 4.6.