
switch Selection Structure

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Last Time

- ◆ We
 - Covered abbreviated assignment statements
 - Learnt about the increment and decrement operators
 - Started looking at the `for` repetition structure
 - Top-down, stepwise refinement
- ◆ Today we will
 - Cover more examples of the for loop
 - Introduce the switch selection structure
 - Learn about ASCII values

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Localized Declarations

```
for (int i = 0; i < n; i++)  
    cout << i << endl;  
cout << i << endl;
```

`i` is declared ONLY in the loop

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Rewrite using a while loop

```
for (i = 5; i < 10; i+= 2)  
    cout << i;
```

What does this output?

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Problem

- ◆ Write a program that will print the sum of the odd integers between 1 and 50 inclusive. Write one program using a while and the other using a for loop.

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Switch Statements

- ◆ Another form of selection statement
- ◆ Similar to if's
- ◆ Useful for lots of alternatives

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Example

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

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Form

```
switch (selector)
{
  case label1: statements1;
                break;
  case label2: statements2;
                break;
  ...
  case labeln: statementsn;
                break;
  default: statements;
}
```

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Example

```
switch (musical_note)
{
  case 'c':
    cout << "do" << endl;
    break;
  case 'd':
    cout << "re" << endl;
    break;
  case 'e':
    cout << "mi" << endl;
    break;
  case 'f':
    cout << "fa" << endl;
    break;
  case 'g':
    cout << "sol" << endl;
    break;
  case 'a':
    cout << "la" << endl;
    break;
  case 'b':
    cout << "ti" << endl;
    break;
  default:
    cout << "An invalid
    note was read.";
}
```

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Important!

- Selector must be a constant integral expression
- Each possible value is a separate case
- break stops statements for case, otherwise continue with statements for next case

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Example

```
switch (color)
{
  case 'R': case 'r':
    cout << "red" << endl;
  case 'B': case 'b':
    cout << "blue" << endl;
  case 'Y': case 'y':
    cout << "yellow" << endl;
}
```

What happens when color is 'r'? 'B'? 'Y'?

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Example

```
switch (x > y)
{
  case 1:
    cout << "x greater" << endl;
    break;
  case 0:
    cout << "y greater or equal" << endl;
    break;
}
```

Write as if statement

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Questions

- Can you write any switch statement as an if?
- Can you write any if statement as a switch?

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Example

```
int grade; // one grade
int aCount = 0; // number of As
int bCount = 0; // number of Bs
int cCount = 0; // number of Cs
int dCount = 0; // number of Ds
int fCount = 0; // number of Fs

cout << "Enter the letter grades." << endl
     << "Enter the EOF character to end input."
     << endl;

// loop until user types end-of-file key sequence
while ( ( grade = cin.get() ) != EOF ) {
```

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Example

```
switch ( grade ) { // switch structure
case 'A': // grade was uppercase A
case 'a': // or lowercase a
    ++aCount; // increment aCount
    break; // necessary to exit switch
case 'B': // grade was uppercase B
case 'b': // or lowercase b
    ++bCount; // increment bCount
    break; // exit switch
case 'C': // grade was uppercase C
case 'c': // or lowercase c
    ++cCount; // increment cCount
    break; // exit switch
case 'D': // grade was uppercase D
case 'd': // or lowercase d
    ++dCount; // increment dCount
    break; // exit switch
```

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Example

```
case 'F': // grade was uppercase F
case 'f': // or lowercase f
    ++fCount; // increment fCount
    break; // exit switch
case '\n': // ignore newlines,
case '\t': // tabs,
case ' ': // and spaces in input
    break; // exit switch
default: // catch all other characters
    cout << "Incorrect letter grade entered."
         << " Enter a new grade." << endl;
    break; // optional
} // end switch
} // end while
```

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cin.get()

- Used to read one character from the keyboard at a time
- Also reads new lines, spaces, and tabs as a character
 - '\n': new line
 - '\t': tab
 - ' ': space

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ASCII Values

- All characters have integer values called ASCII values
 - 'a': 97
 - 'b': 98
 - 'z': 122
 - 'A': 65
 - 'B': 66
 - 'Z': 90

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ASCII

- ASCII: American Standard Code for Information Interchange
- Appendix B lists the ASCII character set

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EOF

- An integer constant defined in the `iostream` library
- On Unix it is:
 - `<ctrl-d>`
- On Windows it is:
 - `<ctrl-z>`

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Change to switch

```
if (speed > 35)
    fee = 20.00;
else if (speed > 50)
    fee = 40.00;
else if (speed > 75)
    fee = 60.00;
```

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Examples

- Write an if statement that prints out the level of schooling. (0, none; 1 through 6, elementary; 7 through 8, middle school; 9 through 12, high school; > 12, college)
- Write a switch statement to do the same

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Summary

- In today's lecture we covered
 - More examples on the `for` repetition structures
 - `switch` selection structure
 - ASCII values
 - `cin.get()`
- Readings
 - P. 113 - 119 `switch` selection structure

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