
switch Selection Structure

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Last Time

- We
 - Covered abbreviated assignment statements
 - Learned 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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Problem

- 12.8: Write a program that allows the user to enter an unknown number of integer values one at a time. When the user enters -999, you are to terminate the loop and print the following:
 - The sum of all integers inputted
 - The average of all integers inputted
 - The largest integer of all integers inputted

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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;
}
13.1: 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;
}
13.2: Write as if statement
```

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Questions

- 13.3: Can you write any switch statement as an if? Why or why not?
- 13.4: Can you write any if statement as a switch? Why or why not?

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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

- 13.5: 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)
- 13.6: 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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