Overview
Concepts this lecture
  The switch statement
  Choosing between if and switch
Reading
  Textbook sec. 4.8

Review: Conditional Control Flow
The if statement chooses one of two statements to execute before continuing
An if statement could also be used to decide whether or not to skip a statement before continuing

Multi-way Control Flow
The choice may be "multi-way" rather than simply between two alternatives
In C, if statements can be used, and sometimes a statement called the switch can be used

Multi-way Choice with if
/* How many days in a month? */
if ( month == 1 ) {
  /* Jan */
  days = 31;
} else if ( month == 2 ) {
  /* Feb */
  days = 28;
} else if ( month == 3 ) {
  /* Mar */
  days = 31;
} else if ( month == 4 ) {
  /* Apr */
  days = 30;
} ...
/* need 12 of these */

Better...
if ( month == 9 || month == 4 || /* Sep, Apr */
    month == 6 || month == 11 ) { /* Jun, Nov */
  days = 30;
} else if ( month == 2 ) { /* Feb */
  days = 28;
} else {
  days = 31; /* All the rest */
}
Alternative: switch

A switch is a form of conditional statement.

It is specifically designed to be useful in multi-way choice situations.

Instead of a condition, there is a value which is tested, and a series of cases of which only one may be chosen.

Using switch

/* How many days in a month? */
switch ( month ) {
case 2:  /* February */
days = 28 ;
break ;
case 3:  /* September */
case 4:  /* April */
case 6:  /* June */
case 11: /* November */
days = 30 ;
break ;
default: /* All the rest have 31 ...*/
days = 31 ;
}
printf ( "There are %d days. \n ", days ) ;

Symbolic constants work, too

/* How many days in a month? */
#define JANUARY   1
#define FEBRUARY 2
#define DECEMBER 12
switch ( month ) {
case FEBRUARY :
days = 28 ;
break ;
case SEPTEMBER :
case APRIL :
case JUNE :
case NOVEMBER :
days = 30 ;
break ;
default : /* All the rest have 31 ...*/
days = 31 ;
}
printf ( "There are %d days. \n ", days ) ;

Cases

A case is a section of code within the switch statement. A case is executed only if the switch expression has a specified value

`case value:` /* a sequence of statements*/

The sequence is typically ended with special statement

`break;`

`break` causes the entire switch statement to end

The switch expression

The switch expression is *not* a conditional expression as it is in an `if` statement

Only an integer expression is allowed

Most often, the expression is a single integer variable

The value of the variable determines which case is chosen
**switch: Flow of Control**

```c
month = 6;
switch (month) {
    case 2: /* February */
        days = 28;
        break;
    case 9: /* September */
    case 4: /* April */
    case 6: /* June */
    case 11: /* November */
        days = 30;
        break;
    default: /* All the rest have 31 ... */
        days = 31;
}
printf("There are %d days.\n", days);
```

**The Biggest Pitfall of switch**

```c
month = 6;
switch (month) {
    case 2: /* February */
        days = 28; /* break missing */
    case 9: /* September */
    case 4: /* April */
    case 6: /* June */
    case 11: /* November */
        days = 30; /* break missing */
    default: /* All the rest have 31 ... */
        days = 31;
}
printf("There are %d days.\n", days);
```

**switch on char is also legal**

```c
char marital_status;
...
switch (marital_status) {
    case 'm':
    case 'M':
        ...
    case 's':
    case 'S':
        printf("Single \n");
        break;
    default:
        printf("Sorry, I don't recognize that code.\n");
}
```

*Remember... a char is just an ASCII value underneath!*

**Summing Up**

Switch is a form of conditional statement

Switch works for multi-way conditions that depend upon an integer (or char) value

Beware the syntax of switch!

The switch and if statements are *not* fully interchangeable

---

**Bonus Footnote**

```c
char marital_status;
...
switch (marital_status) {
    case 'm':
    case 'M':
        ...
Why should a character be allowed here, when the expression is supposed to be an integer?

Answer: The actual machine representation of a character is a small integer.

Most of the time, however, you should treat ints, and chars as fully different types!
```

**QOTD: A switch Minefield**

Explain everything that’s wrong with the following ill-conceived switch statement...

```c
switch (some_num) {
    printf("This line will NEVER be executed! Why?\n");
    case 2:
        printf("Something simple wrong with this!\n");
    break;
    case BASE != 36:
        printf("This will work, but not how you expect!\n");
        break;
    case4:
        printf("Syntactically valid...\n");
    printf("But it won't do what you want it to do!\n");
    break;
    default:
        printf("This one's syntactically valid, too!\n");
    }
```