CS113: Lecture 10

Topics:

- I/O
- Style

I/O: sprinting

- We have been using the functions `printf` to print out messages, and `scanf` to receive input.

- `sprintf` is the same as `printf`, but accepts one additional parameter, a string (the first parameter). The output is placed in this string instead of being output to the screen.

  Example:

```
int a = 3, b = 5;
char s[80];

sprintf( s, "a is %d, b is %d\n", a, b );
```

I/O: scanf, sscanf

- `sscanf` is also the same as `scanf`, but accepts one additional parameter, a string; `sscanf` reads from this string instead of from the keyboard.

  `scanf` and `sscanf` both return an `int` equal to the number of tokens that were matched.

  Example:

```
if( sscanf( line, "%d %s %d", &day,
            monthname, &year ) == 3 )
{
   /* 25 Dec 1988 form */
   printf( "valid: %s\n", line );
}
else if( sscanf( line, "%d/%d/%d",
         &month, &day, &year ) == 3 )
{
   /* mm/dd/yy form */
   printf( "valid: %s\n", line );
}
else
{
   printf( "invalid: %s\n", line );
}
```

- For more information, see Chapter 7 of K&R.

File I/O

- To write to/read from files, one needs to first call `fopen` to obtain a “file handle”, or file pointer which will be used to access the file. File pointers have type `FILE *`. After one is done using the file, `fclose` should be called.

- `fopen` accepts two parameters, the file name and the mode of access: `"w"` for writing, and `"r"` for reading.

- Example:

```
FILE *in_file;
int a;

in_file = fopen( "input.txt", "r" );
if( in_file == NULL )
{
   printf( "Error opening file input.txt.\n" );
   exit( 1 );
}
fscanf( in_file, "%d", &a );
fclose( in_file );
```

- Once the file has been opened, one can read/write using the functions `fscanf` and `fprintf`; these accept as their first parameter file pointers. All other parameters are interpreted as they would be in a call to `scanf` or `printf`.

Style: Flow control

In an `if/else` statement, write the shorter clause first:

```
if( condition )
{
   a = b + c;
   reinitialize( &a );
   do_stuff();
   do_more_stuff();
}
else
{
   a = b - c;
}
```

becomes

```
if( !condition )
{
   a = b - c;
}
else
{
   a = b + c;
   reinitialize( &a );
   do_stuff();
   do_more_stuff();
}
```

Style: Flow control

Remember that `else` is unnecessary after `return`, `break`, and `continue`.

Before... and after...

```
if( a < b )
{
   do_this();
   return;
}
else
{
   a = b + c;
   if( joe )
   {
      process( a );
   }
   else
   {
      process( b );
   }
   blah();
   blah_blah();
}
```

```
if( a < b )
{
   do_this();
   return;
}

a = b + c;
if( joe )
{
   process( a );
}
else
{
   process( b );
}
blah();
blah_blah();
```

Removing such `else`s reduces the amount of identation necessary.

Style: Flow control

Minimize nesting.

Too many levels of nesting make code less readable. To reduce the amount of nesting, use `return`, `break`, and `continue`, and negate conditions.

```
if( string[1] == '!' )
{
   if( string[2] == '$' )
   {
      do_that();
      do_this();
   }
   else
      return( yo );
}
else
   return( joe );
...
```

becomes

```
if( string[1] != '!' )
   return( joe );
if( string[2] != '$' )
   return( yo );
do_that();
do_this();
...
```

Curiosity: A self-reproducing program

Note that 34 is the ASCII value of the double-quote character.

```
char*s="char*s=%c%s%c;main(){printf(s,34,s,34);}";
main(){printf(s,34,s,34);}
```

(There should be no carriage return in the middle of the program; I inserted one for the sake of formatting.)