Most of the functions in `line.c` are easy to write. The only tricky one is `write_line`, which writes a line with justification. `write_line` writes the characters in `line` one by one, pausing at the space between each pair of words to write additional spaces if needed. The number of additional spaces is stored in `spaces_to_insert`, which has the value `extra_spaces / (num_words - 1)`, where `extra_spaces` is initially the difference between the maximum line length and the actual line length. Since `extra_spaces` and `num_words` change after each word is printed, `spaces_to_insert` will change as well. If `extra_spaces` is 10 initially and `num_words` is 5, then the first word will be followed by 2 extra spaces, the second by 2, the third by 3, and the fourth by 3.

15.4 Building a Multiple-File Program

In Section 2.1, we examined the process of compiling and linking a program that fits into a single file. Let's expand that discussion to cover multiple-file programs. Building a large program requires the same basic steps as building a small one:

- *Compiling.* Each source file in the program must be compiled separately. (Header files don't need to be compiled; the contents of a header file are automatically compiled whenever a source file that includes it is compiled.) For each source file, the compiler generates a file containing object code. These files—known as *object files*—have the extension `.o` in UNIX and `.obj` in Windows.
- *Linking.* The linker combines the object files created in the previous step—along with code for library functions—to produce an executable file. Among other duties, the linker is responsible for resolving external references left behind by the compiler. (An external reference occurs when a function in one file calls a function defined in another file or accesses a variable defined in another file.)

Most compilers allow us to build a program in a single step. With the GCC compiler, for example, we'd use the following command to build the `justify` program of Section 15.3:

```
gcc -o justify justify.c line.c word.c
```

The three source files are first compiled into object code. The object files are then automatically passed to the linker, which combines them into a single file. The `-o` option specifies that we want the executable file to be named `justify`.

Makefiles

Putting the names of all the source files on the command line quickly gets tedious. Worse still, we could waste a lot of time when rebuilding a program if we recompile all source files, not just the ones that were affected by our most recent changes.