

volatile type qualifier ► 20.3

If that's not enough to convince you, consider this: If a `const` object is also declared to be `volatile`, its value may change at any time during execution. Here's an example from the C standard:

```
extern const volatile int real_time_clock;
```

The `real_time_clock` variable may not be changed by the program (because it's declared `const`), yet its value may change via some other mechanism (because it's declared `volatile`).

Q: Why is the syntax of declarators so odd?

A: Declarations are intended to mimic use. A pointer declarator has the form `*p`, which matches the way the indirection operator will later be applied to `p`. An array declarator has the form `a [...]`, which matches the way the array will later be subscripted. A function declarator has the form `f (...)`, which matches the syntax of a function call. This reasoning extends to even the most complicated declarators. Consider the `file_cmd` array of Section 17.7, whose elements are pointers to functions. The declarator for `file_cmd` has the form

```
(*file_cmd[]) (void)
```

and a call of one of the functions has the form

```
(*file_cmd[n]) ();
```

The parentheses, brackets, and `*` are in identical positions.

Exercises

Section 18.1

1. For each of the following declarations, identify the storage class, type qualifiers, type specifiers, declarators, and initializers.
 - (a) `static char **lookup(int level);`
 - (b) `volatile unsigned long io_flags;`
 - (c) `extern char *file_name[MAX_FILES], path[];`
 - (d) `static const char token_buf[] = "";`

Section 18.2

- W 2. Answer each of the following questions with `auto`, `extern`, `register`, and/or `static`.
 - (a) Which storage class is used primarily to indicate that a variable or function can be shared by several files?
 - (b) Suppose that a variable `x` is to be shared by several functions in one file but hidden from functions in other files. Which storage class should `x` be declared to have?
 - (c) Which storage classes can affect the storage duration of a variable?
3. List the storage duration (static or automatic), scope (block or file), and linkage (internal, external, or none) of each variable and parameter in the following file: