```
union {
  struct {
    WORD ax, bx, cx, dx;
  } word;
  struct {
    BYTE al, ah, bl, bh, cl, ch, dl, dh;
  } byte;
} regs;
```

The members of the `word` structure will be overlaid with the members of the `byte` structure; for example, `ax` will occupy the same memory as `al` and `ah`. And that, of course, is exactly what we wanted. Here's an example showing how the `regs` union might be used:

```
regs.byte.ah = 0x12;
regs.byte.al = 0x34;
printf("AX: %hx\n", regs.word.ax);
```

Changing `ah` and `al` affects `ax`, so the output will be

```
AX: 1234
```

Note that the `byte` structure lists `al` before `ah`, even though the AL register is the "low" half of AX and AH is the "high" half. Here's the reason. When a data item consists of more than one byte, there are two logical ways to store it in memory: with the bytes in the "natural" order (with the leftmost byte stored first) or with the bytes in reverse order (the leftmost byte is stored last). The first alternative is called ***big-endian;*** the second is known as ***little-endian.*** C doesn't require a specific byte ordering, since that depends on the CPU on which a program will be executed. Some CPUs use the big-endian approach and some use the little-endian approach. What does this have to do with the `byte` structure? It turns out that x86 processors assume that data is stored in little-endian order, so the first byte of `regs.word.ax` is the low byte.

Q&A

We don't normally need to worry about byte ordering. However, programs that deal with memory at a low level must be aware of the order in which bytes are stored (as the `regs` example illustrates). It's also relevant when working with files that contain non-character data.

Be careful when using unions to provide multiple views of data. Data that is valid in its original format may be invalid when viewed as a different type, causing unexpected problems.

Using Pointers as Addresses

We saw in Section 11.1 that a pointer is really some kind of memory address, although we usually don't need to know the details. When we do low-level programming, however, the details matter.