

## Section 2.1 C++11

## alignas

```
int    y;        // size 4; alignment 16
char  b[44];    // padding
double z;       // size 8; alignment 64
char  c[56];    // padding (optional)
}; // size 128; alignment 64
```

Again, if more than one alignment specifier pertains to a given data member, the strictest applicable alignment value is applied:

```
struct T4
{
    alignas(2) char
        c1 alignas(1), // size 1; alignment 2
        c2 alignas(2), // size 1; alignment 2
        c4 alignas(4); // size 1; alignment 4
}; // size 8; alignment 4
```

### Strengthening the alignment of a user-defined type

The **alignas** specifier can also be used to specify alignment for UDTs, such as a **class**, **struct**, **union**, or **enum**. When specifying the alignment of a UDT, the **alignas** keyword is placed *after* the ~~type specifier~~ (e.g., **class**) and just before the name of the type (e.g., **C**):

```
class alignas( 2) C { }; // OK, aligned on a 2-byte boundary; size = 2
struct alignas( 4) S { }; // OK, aligned on a 4-byte boundary; size = 4
union alignas( 8) U { }; // OK, aligned on an 8-byte boundary; size = 8
enum alignas(16) E { }; // OK, aligned on a 16-byte boundary; size = 4
```

Notice that, for each of **class**, **struct**, and **union** in the example above, the **sizeof** objects of that type increased to match the alignment; ~~in the case of the **enum**, however, the size remains that of the default underlying type, e.g., 4 bytes, on the current platform. When **alignas** is applied to an enumeration **E**, the Standard does not indicate whether padding bytes are added to **E**'s object representation, affecting the result of **sizeof(E)**.~~<sup>2</sup>

Again, specifying an alignment that is less than what would be without the **alignas** specifier is ill formed:

```
struct alignas(2) T0 { int i; };
// Error, alignment of T0 (2) is less than that of int (4).
struct alignas(1) T1 { C c; };
// Error, alignment of T1 (1) is less than that of C (2).
```

<sup>2</sup>The implementation variance resulting from this lack of clarity in the Standard was captured in CWG issue 2354 (miller17). The outcome of the core issue was to completely remove permission for **alignas** to be applied to enumerations; see iso18a. Therefore, conforming implementations will eventually stop accepting the **alignas** specifier on enumerations in the future.