

constexpr Functions

Chapter 2 Conditionally Safe Features

```
constexpr bool cf() { return true; } // constexpr function returning true
bool nf() { return true; } // nonconstexpr function returning true

typedef bool (*Fp)(); // pointer to function taking no args. and returning bool

constexpr Fp cpcf = cf; // constexpr pointer to a constexpr function
Fp npcfcf = cf; // nonconstexpr pointer to a constexpr function
constexpr Fp cpnfcf = nf; // constexpr pointer to a nonconstexpr function
Fp npnfcf = nf; // nonconstexpr pointer to a nonconstexpr function
constexpr Fp cpz = 0; // constexpr pointer having null pointer value

static_assert(cpcf == &cf, ""); // OK, reading a constexpr pointer
static_assert(npcfcf == &cf, ""); // Error, npcfcf is not a constexpr pointer.
static_assert(cpz == 0, ""); // OK, reading a constexpr pointer

static_assert(cpcf(), ""); // OK, invoking a constexpr function through a
// constexpr pointer
static_assert(npcfcf(), ""); // Error, npcfcf is not a constexpr pointer.
static_assert(cpnfcf(), ""); // Error, can't invoke nonconstexpr function
static_assert(npnfcf(), ""); // Error, npnfcf is not a constexpr pointer.
static_assert(cpz(), ""); // Error, 0 doesn't designate a function.
```

constexpr member functions

Member functions — including certain **special member functions**, such as *constructors* but not *destructors* — can be declared to be **constexpr**; see *Literal types defined* on page 278:

```
class Point1
{
    int d_x, d_y; // two ordinary int data members
public:
    constexpr Point1(int x, int y) : d_x(x), d_y(y) { } // OK, is constexpr

    constexpr int x() { return d_x; } // OK, is constexpr
    int y() const { return d_y; } // OK, is not constexpr
};
```

Simple classes, such as `Point1` above, having at least one **constexpr** constructor that is neither a *copy* nor a *move* constructor and satisfies all other requirements of being a **literal type** — see *Literal types defined* on page 278 — can be evaluated as part of **constant expressions**. However, it is only when combined with a means to access a data member at compile time (e.g., via a public data member, a **constexpr** accessor, or a free **constexpr friend** function) that an object of even literal type can contribute to a **constant expression's value**:

```
int ax[Point1(5, 6).x()]; // OK, array of 5 ints
int ay[Point1(5, 6).y()]; // Error, accessor y is not declared constexpr.
```