

## Section 2.1 C++11

## Lambdas

known return type (**double**). The second **lambda expression** returns a value by brace initialization, which is insufficient for deducing a return value. Again, the issue is resolved by specifying the return type explicitly. Note that, unlike ordinary functions, a **lambda expression** cannot have a return type specified before the **lambda introducer** or **lambda declarator**:

```
auto c5 = int [] () { return 0; }; // Error, return type misplaced
auto c6 = [] int () { return 0; }; // Error, return type misplaced
auto c7 = [] () -> int { return 0; }; // OK, trailing return type
```

Attributes (see Section 1.1. “Attribute Syntax” on page 12) that appertain to the *type* of call operator can be inserted in the **lambda declarator** just before the **trailing return type**. If there is no **trailing return type**, the attributes can be inserted before the open brace of the **lambda body**. Unfortunately, these attributes do not appertain to the **call operator** itself, but to its type, ruling out some common attributes:

```
#include <cstdlib> // std::abort
auto c1 = []() noexcept [[noreturn]] { // Error, [[noreturn]] on a type
    std::abort();
};
```

### Lambda body

Combined, the **lambda declarator** and the **lambda body** make up the declaration and definition of an **inline** member function that is the **call operator** for the **closure type**. For the purposes of name lookup and the interpretation of **this**, the **lambda body** is considered to be in the context where the **lambda expression** is evaluated (independent of the context where the **closure’s call operator** is invoked).

Critically, the set of entity names that can be used from within the **lambda body** is not limited to captured local variables. Types, functions, templates, constants, and so on — just like for any other member function — do not need to be captured and, in fact, *cannot* be captured in most cases. To illustrate, let’s create a number of entities in multiple scopes:

```
#include <iostream> // std::cout

namespace ns1
{
    void f1() { std::cout << "ns1::f1" << '\n'; }
    struct Class1 { Class1() { std::cout << "ns1::Class1()" << '\n'; } };
    int g0 = 0;
}

namespace ns2
{
    void f1() { std::cout << "ns2::f1" << '\n'; }

    template <typename T>
    struct Class1 { Class1() { std::cout << "ns2::Class1()" << '\n'; } };
}
```