

Section 1.1 C++11

noreturn

The compiler is within its rights to elide code that is rendered unreachable by the call to the `throwBadAlloc` function due to the function being decorated with the `[[noreturn]]` attribute on its declaration:

```
// client.cpp:
#include <util.h> // [[noreturn]] void throwBadAlloc()

void client()
{
    // ...
    throwBadAlloc();
    // ... (Everything below this line can be optimized away.)
}
```

Notice that even though `[[noreturn]]` appeared only on the first declaration — that in the `util.h` header — the `[[noreturn]]` attribute carries over to the redeclaration used in the `throwBadAlloc` function’s definition because the header was included in the corresponding `.cpp` file.

Potential Pitfalls

[[noreturn]] can inadvertently break an otherwise working program

Unlike many attributes, using `[[noreturn]]` *can* alter the semantics of a well-formed program, potentially introducing a runtime defect and/or making the program ill formed. If a function that can potentially return is decorated with `[[noreturn]]` and then, in the course of ~~executing a program~~, it ever does return, that behavior is **undefined**.

Consider a `printAndExit` function whose role is to print a fatal error message before aborting the program:

```
[[noreturn]] void printAndExit()
{
    std::cout << "Fatal error. Exiting the program.\n";
    assert(false);
}
```

The programmer chose to sloppily implement termination by using an assertion, which would not be incorporated into a program compiled with the preprocessor definition `NDEBUG` active, and thus `printAndExit` would return normally in such a build mode. If the compiler of the client is informed that function will not return, the compiler is free to optimize accordingly. If the function then does return, any number of hard-to-diagnose defects, e.g., due to incorrectly elided code, might materialize as a consequence of the ensuing **undefined behavior**. Furthermore, if a function is declared `[[noreturn]]` in some translation units within a program but not in others, that program is **ill formed, no diagnostic required (IFNDR)**.