7 [*Example:* An aligned buffer with an alignment requirement of `A` and holding `N` elements of type `T` can be declared as:

```
alignas(T) alignas(A) T buffer[N];
```

Specifying `alignas(T)` ensures that the final requested alignment will not be weaker than `alignof(T)`, and therefore the program will not be ill-formed. *— end example*]

8 [*Example:*

```
alignas(double) void f();                          // error: alignment applied to function
alignas(double) unsigned char c[sizeof(double)];   // array of characters, suitably aligned for a double
extern unsigned char c[sizeof(double)];            // no alignas necessary
alignas(float)
  extern unsigned char c[sizeof(double)];          // error: different alignment in declaration
```

— end example]

7.6.3 Carries dependency attribute [dcl.attr.depend]

1 The *attribute-token* `carries_dependency` specifies dependency propagation into and out of functions. It shall appear at most once in each *attribute-list* and no *attribute-argument-clause* shall be present. The attribute may be applied to the *declarator-id* of a *parameter-declaration* in a function declaration or lambda, in which case it specifies that the initialization of the parameter carries a dependency to (1.10) each lvalue-to-rvalue conversion (4.1) of that object. The attribute may also be applied to the *declarator-id* of a function declaration, in which case it specifies that the return value, if any, carries a dependency to the evaluation of the function call expression.

2 The first declaration of a function shall specify the `carries_dependency` attribute for its *declarator-id* if any declaration of the function specifies the `carries_dependency` attribute. Furthermore, the first declaration of a function shall specify the `carries_dependency` attribute for a parameter if any declaration of that function specifies the `carries_dependency` attribute for that parameter. If a function or one of its parameters is declared with the `carries_dependency` attribute in its first declaration in one translation unit and the same function or one of its parameters is declared without the `carries_dependency` attribute in its first declaration in another translation unit, the program is ill-formed; no diagnostic required.

3 [*Note:* The `carries_dependency` attribute does not change the meaning of the program, but may result in generation of more efficient code. *— end note*]

4 [*Example:*

```
/* Translation unit A. */

struct foo { int* a; int* b; };
std::atomic<struct foo *> foo_head[10];
int foo_array[10][10];

[[carries_dependency]] struct foo* f(int i) {
  return foo_head[i].load(memory_order_consume);
}

int g(int* x, int* y [[carries_dependency]]) {
  return kill_dependency(foo_array[*x][*y]);
}

/* Translation unit B. */

[[carries_dependency]] struct foo* f(int i);
int g(int* x, int* y [[carries_dependency]]);
```


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7 [*Example:* An aligned buffer with an alignment requirement of `A` and holding `N` elements of type `T` can be declared as:

```
alignas(T) alignas(A) T buffer[N];
```

Specifying `alignas(T)` ensures that the final requested alignment will not be weaker than `alignof(T)`, and therefore the program will not be ill-formed. *— end example*]

8 [*Example:*

```
alignas(double) void f();                          // error: alignment applied to function
alignas(double) unsigned char c[sizeof(double)];   // array of characters, suitably aligned for a double
extern unsigned char c[sizeof(double)];            // no alignas necessary
alignas(float)
  extern unsigned char c[sizeof(double)];          // error: different alignment in declaration
```

— end example]

7.6.3 Carries dependency attribute [dcl.attr.depend]

1 The *attribute-token* `carries_dependency` specifies dependency propagation into and out of functions. It shall appear at most once in each *attribute-list* and no *attribute-argument-clause* shall be present. The attribute may be applied to the *declarator-id* of a *parameter-declaration* in a function declaration or lambda, in which case it specifies that the initialization of the parameter carries a dependency to (1.10) each lvalue-to-rvalue conversion (4.1) of that object. The attribute may also be applied to the *declarator-id* of a function declaration, in which case it specifies that the return value, if any, carries a dependency to the evaluation of the function call expression.

2 The first declaration of a function shall specify the `carries_dependency` attribute for its *declarator-id* if any declaration of the function specifies the `carries_dependency` attribute. Furthermore, the first declaration of a function shall specify the `carries_dependency` attribute for a parameter if any declaration of that function specifies the `carries_dependency` attribute for that parameter. If a function or one of its parameters is declared with the `carries_dependency` attribute in its first declaration in one translation unit and the same function or one of its parameters is declared without the `carries_dependency` attribute in its first declaration in another translation unit, the program is ill-formed; no diagnostic required.

3 [*Note:* The `carries_dependency` attribute does not change the meaning of the program, but may result in generation of more efficient code. *— end note*]

4 [*Example:*

```
/* Translation unit A. */

struct foo { int* a; int* b; };
std::atomic<struct foo *> foo_head[10];
int foo_array[10][10];

[[carries_dependency]] struct foo* f(int i) {
  return foo_head[i].load(memory_order_consume);
}

int g(int* x, int* y [[carries_dependency]]) {
  return kill_dependency(foo_array[*x][*y]);
}

/* Translation unit B. */

[[carries_dependency]] struct foo* f(int i);
int g(int* x, int* y [[carries_dependency]]);
```

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Rationale: In C++, implicit int creates several opportunities for ambiguity between expressions involving function-like casts and declarations. Explicit declaration is increasingly considered to be proper style. Liaison with WG14 (C) indicated support for (at least) deprecating implicit int in the next revision of C.
Effect on original feature: Deletion of semantically well-defined feature.
Difficulty of converting: Syntactic transformation. Could be automated.
How widely used: Common.

7.1.7.4
Change: The keyword `auto` cannot be used as a storage class specifier.

```
void f() {
  auto int x;      // valid C, invalid C++
}
```

Rationale: Allowing the use of `auto` to deduce the type of a variable from its initializer results in undesired interpretations of `auto` as a storage class specifier in certain contexts.
Effect on original feature: Deletion of semantically well-defined feature.
Difficulty of converting: Syntactic transformation.
How widely used: Rare.

7.2
Change: C++ objects of enumeration type can only be assigned values of the same enumeration type. In C, objects of enumeration type can be assigned values of any integral type.

Example:

```
enum color { red, blue, green };
enum color c = 1;               // valid C, invalid C++
```

Rationale: The type-safe nature of C++.
Effect on original feature: Deletion of semantically well-defined feature.
Difficulty of converting: Syntactic transformation. (The type error produced by the assignment can be automatically corrected by applying an explicit cast.)
How widely used: Common.

7.2
Change: In C++, the type of an enumerator is its enumeration. In C, the type of an enumerator is `int`.

Example:

```
enum e { A };
sizeof(A) == sizeof(int)        // in C
sizeof(A) == sizeof(e)          // in C++
/* and sizeof(int) is not necessarily equal to sizeof(e) */
```

Rationale: In C++, an enumeration is a distinct type.
Effect on original feature: Change to semantics of well-defined feature.
Difficulty of converting: Semantic transformation.
How widely used: Seldom. The only time this affects existing C code is when the size of an enumerator is taken. Taking the size of an enumerator is not a common C coding practice.

C.1.7 Clause 8: declarators [diff.decl]

8.3.5
Change: In C++, a function declared with an empty parameter list takes no arguments. In C, an empty

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Rationale: In C++, implicit int creates several opportunities for ambiguity between expressions involving function-like casts and declarations. Explicit declaration is increasingly considered to be proper style. Liaison with WG14 (C) indicated support for (at least) deprecating implicit int in the next revision of C.
Effect on original feature: Deletion of semantically well-defined feature.
Difficulty of converting: Syntactic transformation. Could be automated.
How widely used: Common.

7.1.7.4
Change: The keyword `auto` cannot be used as a storage class specifier.

```
void f() {
  auto int x;      // valid C, invalid C++
}
```

Rationale: Allowing the use of `auto` to deduce the type of a variable from its initializer results in undesired interpretations of `auto` as a storage class specifier in certain contexts.
Effect on original feature: Deletion of semantically well-defined feature.
Difficulty of converting: Syntactic transformation.
How widely used: Rare.

7.2
Change: C++ objects of enumeration type can only be assigned values of the same enumeration type. In C, objects of enumeration type can be assigned values of any integral type.

Example:

```
enum color { red, blue, green };
enum color c = 1;               // valid C, invalid C++
```

Rationale: The type-safe nature of C++.
Effect on original feature: Deletion of semantically well-defined feature.
Difficulty of converting: Syntactic transformation. (The type error produced by the assignment can be automatically corrected by applying an explicit cast.)
How widely used: Common.

7.2
Change: In C++, the type of an enumerator is its enumeration. In C, the type of an enumerator is `int`.

Example:

```
enum e { A };
sizeof(A) == sizeof(int)        // in C
sizeof(A) == sizeof(e)          // in C++
/* and sizeof(int) is not necessarily equal to sizeof(e) */
```

Rationale: In C++, an enumeration is a distinct type.
Effect on original feature: Change to semantics of well-defined feature.
Difficulty of converting: Semantic transformation.
How widely used: Seldom. The only time this affects existing C code is when the size of an enumerator is taken. Taking the size of an enumerator is not a common C coding practice.

C.1.7 Clause 8: declarators [diff.decl]

8.3.5
Change: In C++, a function declared with an empty parameter list takes no arguments. In C, an empty

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How widely used: Seldom. This style of array initialization is seen as poor coding style.

C.1.8 Clause 9: classes [diff.class]

9.1 [see also 7.1.3]
Change: In C++, a class declaration introduces the class name into the scope where it is declared and hides any object, function or other declaration of that name in an enclosing scope. In C, an inner scope declaration of a struct tag name never hides the name of an object or function in an outer scope.

Example:

```
int x[99];
void f() {
  struct x { int a; };
  sizeof(x);  /* size of the array in C */
  /* size of the struct in C++ */
}
```

Rationale: This is one of the few incompatibilities between C and C++ that can be attributed to the new C++ name space definition where a name can be declared as a type and as a non-type in a single scope causing the non-type name to hide the type name and requiring that the keywords `class`, `struct`, `union` or `enum` be used to refer to the type name. This new name space definition provides important notational conveniences to C++ programmers and helps making the use of the user-defined types as similar as possible to the use of fundamental types. The advantages of the new name space definition were judged to outweigh by far the incompatibility with C described above.
Effect on original feature: Change to semantics of well-defined feature.
Difficulty of converting: Semantic transformation. If the hidden name that needs to be accessed is at global scope, the `::` C++ operator can be used. If the hidden name is at block scope, either the type or the struct tag has to be renamed.
How widely used: Seldom.

9.2.4
Change: Bit-fields of type plain `int` are signed.
Rationale: Leaving the choice of signedness to implementations could lead to inconsistent definitions of template specializations. For consistency, the implementation freedom was eliminated for non-dependent types, too.
Effect on original feature: The choice is implementation-defined in C, but not so in C++.
Difficulty of converting: Syntactic transformation.
How widely used: Seldom.

9.2.5
Change: In C++, the name of a nested class is local to its enclosing class. In C the name of the nested class belongs to the same scope as the name of the outermost enclosing class.

Example:

```
struct X {
  struct Y { /* ... */ } y;
};
struct Y yy;                    // valid C, invalid C++
```

Rationale: C++ classes have member functions which require that classes establish scopes. The C rule would leave classes as an incomplete scope mechanism which would prevent C++ programmers from maintaining locality within a class. A coherent set of scope rules for C++ based on the C rule would be very complicated and C++ programmers would be unable to predict reliably the meanings of nontrivial examples involving

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How widely used: Seldom. This style of array initialization is seen as poor coding style.

C.1.8 Clause 9: classes [diff.class]

9.1 [see also 7.1.3]
Change: In C++, a class declaration introduces the class name into the scope where it is declared and hides any object, function or other declaration of that name in an enclosing scope. In C, an inner scope declaration of a struct tag name never hides the name of an object or function in an outer scope.

Example:

```
int x[99];
void f() {
  struct x { int a; };
  sizeof(x);  /* size of the array in C */
  /* size of the struct in C++ */
}
```

Rationale: This is one of the few incompatibilities between C and C++ that can be attributed to the new C++ name space definition where a name can be declared as a type and as a non-type in a single scope causing the non-type name to hide the type name and requiring that the keywords class, struct, union or enum be used to refer to the type name. This new name space definition provides important notational conveniences to C++ programmers and helps making the use of the user-defined types as similar as possible to the use of fundamental types. The advantages of the new name space definition were judged to outweigh by far the incompatibility with C described above.
Effect on original feature: Change to semantics of well-defined feature.
Difficulty of converting: Semantic transformation. If the hidden name that needs to be accessed is at global scope, the :: C++ operator can be used. If the hidden name is at block scope, either the type or the struct tag has to be renamed.
How widely used: Seldom.

9.2.4
Change: Bit-fields of type plain int are signed.
Rationale: Leaving the choice of signedness to implementations could lead to inconsistent definitions of template specializations. For consistency, the implementation freedom was eliminated for non-dependent types, too.
Effect on original feature: The choice is implementation-defined in C, but not so in C++.
Difficulty of converting: Syntactic transformation.
How widely used: Seldom.

9.2.5
Change: In C++, the name of a nested class is local to its enclosing class. In C the name of the nested class belongs to the same scope as the name of the outermost enclosing class.

Example:

```
struct X {
  struct Y { /* ... */ } y;
};
struct Y yy;                    // valid C, invalid C++
```

Rationale: C++ classes have member functions which require that classes establish scopes. The C rule would leave classes as an incomplete scope mechanism which would prevent C++ programmers from maintaining locality within a class. A coherent set of scope rules for C++ based on the C rule would be very complicated and C++ programmers would be unable to predict reliably the meanings of nontrivial examples involving

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