

JTC1/SC22/WG14 - N2780

Title: Forward Declaration of Parameters
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Prior Art: GCC

This is a follow-up paper to N2660. With the recent removal of K&R function definitions, it is impossible to use a later parameter in a size specifier. For this reason and also to make this possible in function declarations which are not definitions, it would be useful to allow forward declarations of parameters. This feature exists as an extension in GCC [1]. Alternatively, it was proposed to allow referring to later arguments in length expressions, but this requires more complicated changes to parsers, has backwards compatibility issues, and requires dealing with mutual dependencies between parameters [2]. GCC supports comma and semicolon to separate multiple forward declarations. Here we propose to allow only the semicolon, because then it is known directly after parsing of each parameter whether it is a forward declaration or already the first real parameter declaration.

Examples:

```
void foo(size_t len; char buf[static len], size_t len);  
void bar(size_t a; size_t b; char d[a], size_t a, const char s[b], size_t b);
```

References:

[1] <https://gcc.gnu.org/onlinedocs/gcc/Variable-Length.html>

[2] Ritchie DM. Variable-size arrays in C. The Journal of C Language Translation 1990;2:81-86.

(proposed wording on next page)

Proposed Wording (relative to N2596)

6.7 Declarations

Constraints

3 If an identifier has no linkage, there shall be no more than one declaration of the identifier (in a declarator or type specifier) with the same scope and in the same name space, except that:

- a typedef name may be redefined to denote the same type as it currently does, provided that type is not a variably modified type;
- tags may be redeclared as specified in 6.7.2.3.

--- parameters declared in a parameter forward declaration are redeclared in the parameter list as specified in 6.7.6.3.

6.7.6 Declarators

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Syntax

```
parameter-type-list:  
    parameter-forward-declaration ; parameter-type-list  
    parameter-list  
    parameter-list , ...  
parameter-forward-declaration:  
    attribute-specifier-sequenceopt declaration-specifiers declarator  
parameter-list:  
    parameter-declaration  
    parameter-list , parameter-declaration  
parameter-declaration:  
    attribute-specifier-sequenceopt declaration-specifiers declarator  
    attribute-specifier-sequenceopt declaration-specifiers abstract-declaratoropt
```

6.7.6.3 Function declarators

Constraints

4 An identifier declared in a parameter forward declaration shall also be declared in the parameter list.

Semantics

5 A parameter type list specifies the types of, and may declare identifiers for, the parameters of the function. **Parameter forward declarations may provide forward declarations of the identifiers of the parameters (for use in size expressions).**