Document: WG14/N1265
Date: 2007/10/01
Project: WG14 TR 24732
References: WG14/N1241, WG14/N1215, WG14/N1247
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Subject: Number of exponent digits with a,A format specifier for decimal float

Background: WG14/N1241 (the current draft of TR 24732) incorporated changes agreed at the London meeting.   Regarding printf formatting of decimal floating-point values, changes were driven by N1215, but altered somewhat from what was suggested in the paper. There were two basic alterations:

1. Instead of changing the formatting rules to reflect additional decimal semantics when a decimal modifier (H, D, or DD) is applied to the C99 g,G format specifiers with default precision, allow the decimal modifiers to be applied to the C99 a,A format specifiers, and have that format reflect the additional decimal semantics (the analogy to a,A format with generic float using hexadecimal being that the A stands for "actual").
2. While agreeing on the rules for determining the precision and form of the output for decimal a,A format as presented in N1215 for decimal g,G format, it was noted that there had been further external discussion between the time the paper was submitted and the time of the meeting about the number of digits to be used for the exponent when the e,E style of output was chosen. The authors of the paper agreed that for decimal floating-point it would be preferable to use the minimum number of digits needed to express the exponent value, rather than using at least two digits as required for e,E format with generic floating values in C99) [Note: Mike Cowlishaw argued very strongly that there should be no leading zero for preferred decimal floating output].

Problem:

N1241 reflected the changes from N1215 along with the first alteration made at the meeting, but it only partly reflected the changes from the second alteration. N1241 incorporated the examples of printf output directly from N1215, and modified some but not all of them to remove the leading zero in the exponents less than 10.   It left the leading zero in place on the last three examples with exponents less than 10. And it did not add words describing this requirement on the exponent. Such words are necessary since the formatting is described in the draft as "`use style e formatting with formatting precision equal to n – 1…`", and C99 explicitly states for e,E specifiers that "`The exponent always contains at least two digits, and only as many more digits as necessary to represent the exponent. If the value is zero, the exponent is zero.`"

Since the changes made to the examples clearly reflect the intent from the last meeting that the exponent should not contain a leading zero, the changes proposed here could be considered editorial in spirit (the changes made to the draft were simply incomplete).

Suggested changes to the TR:

On document page 29 (PDF page 32), second bullet near bottom:

Change:

- otherwise, use style **e** formatting with formatting precision equal to n - 1, except if $c = 0$ then the *digit-sequence* in the *exponent-part* shall have the value q (rather than 0).

to

- otherwise, use style **e** formatting with formatting precision equal to $n - 1$, except if $c = 0$ then the *digit-sequence* in the *exponent-part* shall have the value q (rather than 0), and except that the exponent is always expressed with the minimum number of digits required to represent its value (the exponent never contains a leading zero).

On document page 30 (PDF page 33), change three of the examples toward the end:

> Change:
>
>   (1, 0, -7)   0e-07
>
> to
>
>   (1, 0, -7)   0e-7
>
> Change:
>
>   (1, 0, 2)   0e+02
>
> to
>
>   (1, 0, 2)   0e+2
>
> Change:
>
>   (1, 5, -7)   5e-07
>
> to
>
>   (1, 5, -7)   5e-7