Proposal for C2Y
WG14 N3233

Title:	Recommendation for **`printf`** rounding
Author, affiliation:	C FP group
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Proposal category:	Editorial
Reference:	N3219

The recommended practice in 7.23.6.1 (**`fprintf`**) recommends correct rounding up to a threshold of *M* decimal digits for the result, with a looser specification for more than *M* digits. With this looser specification, increasing the number of output digits could produce a less accurate result: a conversion to *S* digits could be less accurate than the conversion of the same input to *R* digits where $M \le R < S$. This issue was raised to CFP by Vincent Lefevre:

> Let's take an example: M = 6, ~= 1.2345678, and rounding to nearest.
>
> If the number of significant decimal digits is 6, then the RP says
> that the correctly rounded value 1.23457 should be output.
>
> If the number of significant decimal digits is 7, then one considers
> L = 1.23456 and U = 1.23457. According to the RP, 1.234560 is one of
> the possible recommended outputs, since 1.23456 ≤ 1.234560 ≤ 1.23457.
>
> Conclusion: By increasing the number of output digits, one has
> decreased the accuracy!
>
> And this can be the case for any number of decimal digits greater
> than M.
> IMHO, for rounding to nearest on more than M digits, there should
> be an additional requirement: the error should not be larger than
> the one for M digits. With this rule, it is still possible to use
> the correctly rounded value on M digits and pad with zeros.
>
> Note that this is a recommendation: if the error is slightly larger
> than recommended because the algorithm attempts to round correctly
> for almost all cases, this is not an issue.

The same issue is in 7.31.2.1 (**`fwprintf`**).

The following suggested changes address this issue.

Suggested changes (to N3219)**:**

In 7.23.6.1 #13 and in 7.31.2.1 #13, change

> the value of the resultant decimal string *D* should satisfy $L \le D \le U$, with the extra stipulations that the error should have a correct sign for the current rounding direction and that increasing the number of decimal digits for the result should not decrease the accuracy of the result.