The \texttt{l3str-format} package: formatting strings of characters

The \LaTeX\ Project*

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1 Format specifications

In this module, we introduce the notion of a string \texttt{(format)}. The syntax follows that of Python’s \texttt{format} built-in function. A \texttt{(format specification)} is a string of the form

\[
\langle \text{format specification} \rangle = \lfloor (\langle \text{fill} \rangle (\langle \text{alignment} \rangle ) (\langle \text{sign} \rangle ) (\langle \text{width} \rangle ) (\langle \text{precision} \rangle ) (\langle \text{style} \rangle ) \rfloor
\]

where each \([\ldots]\) denotes an independent optional part.

- \texttt{(fill)} can be any character: it is assumed to be present whenever the second character of the \texttt{(format specification)} is a valid \texttt{(alignment)} character.

- \texttt{(alignment)} can be \texttt{<} (left alignment), \texttt{>} (right alignment), \texttt{^} (centering), or \texttt{=} (for numeric types only).

- \texttt{(sign)} is allowed for numeric types; it can be \texttt{+} (show a sign for positive and negative numbers), \texttt{-} (only put a sign for negative numbers), or a space (show a space or a \texttt{-}).

- \texttt{(width)} is the minimum number of characters of the result: if the result is naturally shorter than this \texttt{(width)}, then it is padded with copies of the character \texttt{(fill)}, with a position depending on the choice of \texttt{(alignment)}. If the result is naturally longer, it is not truncated.

- \texttt{(precision)}, whose presence is indicated by a period, can have different meanings depending on the type.

- \texttt{(style)} is one character, which controls how the given data should be formatted. The list of allowed \texttt{(styles)} depends on the type.

The choice of \texttt{(alignment)} \texttt{=} is only valid for numeric types: in this case the padding is inserted between the sign and the rest of the number.

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2 Formatting various data-types

\texttt{\textbackslash tl\_format:nn} \{\textit{token list}\} \{\textit{format specification}\}

Converts the \textit{token list} to a string according to the \textit{format specification}. The \textit{style}, if present, must be \texttt{s}. If \textit{precision} is given, all characters of the string representation of the \textit{token list} beyond the first \textit{precision} characters are discarded.

\texttt{\textbackslash seq\_format:nn} \{\textit{sequence}\} \{\textit{format specification}\}

Converts each item in the \textit{sequence} to a string according to the \textit{format specification}, and concatenates the results.

\texttt{\textbackslash int\_format:nn} \{\textit{intexpr}\} \{\textit{format specification}\}

Evaluates the \textit{integer expression} and converts the result to a string according to the \textit{format specification}. The \textit{precision} argument is not allowed. The \textit{style} can be \texttt{b} for binary output, \texttt{d} for decimal output (this is the default), \texttt{o} for octal output, \texttt{X} for hexadecimal output (using capital letters).

\texttt{\textbackslash fp\_format:nn} \{\textit{fpexpr}\} \{\textit{format specification}\}

Evaluates the \textit{floating point expression} and converts the result to a string according to the \textit{format specification}. The \textit{style} can be

- \texttt{e} for scientific notation, with one digit before and \textit{precision} digits after the decimal separator, and an integer exponent, following \texttt{e};
- \texttt{f} for a fixed point notation, with \textit{precision} digits after the decimal separator and no exponent;
- \texttt{g} for a general format, which uses style \texttt{f} for numbers in the range \([10^{-4}, 10^{(\text{precision})}]\) and style \texttt{e} otherwise.

When there is no \textit{style} specifier nor \textit{precision} the number is displayed without rounding. Otherwise the \textit{precision} defaults to 6.

3 Possibilities, and things to do

- Provide a token list formatting \textit{style} which keeps the last \textit{precision} characters rather than the first \textit{precision}.

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