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

The \LaTeX{} Project\textsuperscript{*}

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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

\begin{equation*}
\texttt{(format specification)} = [[[\texttt{fill}]][\texttt{alignment}][\texttt{sign}][\texttt{width}][.\texttt{precision}][\texttt{style}]}
\end{equation*}

where each [...] 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

\tl_format:nn \{\langle token list\rangle\} \{\langle format specification\rangle\}
Converts the \(\langle token list\rangle\) to a string according to the \(\langle format specification\rangle\). The \(\langle style\rangle\), if present, must be \s. If \(\langle precision\rangle\) is given, all characters of the string representation of the \(\langle token list\rangle\) beyond the first \(\langle precision\rangle\) characters are discarded.

\seq_format:nn \{\langle sequence\rangle\} \{\langle format specification\rangle\}
Converts each item in the \(\langle sequence\rangle\) to a string according to the \(\langle format specification\rangle\), and concatenates the results.

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

\fp_format:nn \{\langle fpexpr\rangle\} \{\langle format specification\rangle\}
Evaluates the \(\langle floating point expression\rangle\) and converts the result to a string according to the \(\langle format specification\rangle\). The \(\langle style\rangle\) can be

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

When there is no \(\langle style\rangle\) specifier nor \(\langle precision\rangle\) the number is displayed without rounding. Otherwise the \(\langle precision\rangle\) defaults to 6.

3 Possibilities, and things to do

- Provide a token list formatting \(\langle style\rangle\) which keeps the last \(\langle precision\rangle\) characters rather than the first \(\langle precision\rangle\).

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