

# The l3tl-build package: building token lists

The L<sup>A</sup>T<sub>E</sub>X3 Project\*

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## 1 l3tl-build documentation

This module provides no user function: it is meant for kernel use only.

There are two main ways of building token lists from individual tokens. Either in one go within an `x`-expanding assignment, or by repeatedly using `\tl_put_right:Nn`. The first method takes a linear time, but only allows expandable operations. The second method takes a time quadratic in the length of the token list, but allows expandable and non-expandable operations.

The goal of this module is to provide functions to build a token list piece by piece in linear time, while allowing non-expandable operations. This is achieved by abusing `\toks`: adding some tokens to the token list is done by storing them in a free token register (time  $O(1)$  for each such operation). Those token registers are only put together at the end, within an `x`-expanding assignment, which takes a linear time.<sup>1</sup> Of course, all this must be done in a group: we can't go and clobber the values of legitimate `\toks` used by L<sup>A</sup>T<sub>E</sub>X 2<sub>ε</sub>.

Since none of the current applications need the ability to insert material on the left of the token list, I have not implemented that. This could be done for instance by using odd-numbered `\toks` for the left part, and even-numbered `\toks` for the right part.

### 1.1 Internal functions

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<code>\__tl_build:Nw</code>	<code>\__tl_build:Nw &lt;tl var&gt; ...</code>
<code>\__tl_gbuild:Nw</code>	<code>\__tl_build_one:n {\tokens1} ...</code>
<code>\__tl_build_x:Nw</code>	<code>\__tl_build_one:n {\tokens2} ...</code>
<code>\__tl_gbuild_x:Nw</code>	<code>...</code>

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`\__tl_build_end:`

Defines the `<tl var>` to contain the contents of `<tokens1>` followed by `<tokens2>`, *etc.* This is built in such a way to be more efficient than repeatedly using `\tl_put_right:Nn`. The code in “...” does not need to be expandable. The commands `\__tl_build:Nw` and `\__tl_build_end:` start and end a group. The assignment to the `<tl var>` occurs just after the end of that group, using `\tl_set:Nn`, `\tl_gset:Nn`, `\tl_set:Nx`, or `\tl_gset:Nx`.

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<sup>1</sup>If we run out of token registers, then the currently filled-up `\toks` are put together in a temporary token list, and cleared, and we ultimately use `\tl_put_right:Nx` to put those chunks together. Hence the true asymptotic is quadratic, with a very small constant.

<u><code>\__tl_build_one:n</code></u>	<code>\__tl_build_one:n</code> $\{\langle tokens \rangle\}$
<u><code>\__tl_build_one:(o x)</code></u>	This function may only be used within the scope of a <code>\__tl_build:Nw</code> function. It adds the $\langle tokens \rangle$ on the right of the current token list.
<u><code>\__tl_build_end:</code></u>	Ends the scope started by <code>\__tl_build:Nw</code> , and performs the relevant assignment.

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