



The optimized version replaces the $O(n^2)$ based design with a design that uses 3 pointers,

- past
- current
- next_old

to memorize the location of original positions and swap pointers needed in the linked list around, while maintaining a temporary image of the original pointer configuration. This in turn allows us to reverse the data without duplicating data, recursively traversing, or repeat traversing operations more than once.

As such, this results in code which employs one while loop $O(n)$ and several variables, thus gaining an implementation complexity of $O(n)$. We can see this, in the time taken, which while flat at the scale show, is in fact a linear progression with time, compared to the exponential time complexity seen in the original implementation.