

In computer science, a linked list is a linear collection of data elements whose order is not given by their physical placement in memory. Instead, each element points to the next. It is a data structure consisting of a collection of nodes which together represent a sequence. In its most basic form, each node contains data, and a reference (in other words, a link) to the next node in the sequence. This structure allows for efficient insertion or removal of elements from any position in the sequence during iteration. More complex variants add additional links, allowing more efficient insertion or removal of nodes at arbitrary positions. A drawback of linked lists is that data access time is a linear function of the number of nodes for each linked list (i.e., the access time linearly increases as nodes are added to a linked list.) because nodes are serially linked so a node needs to be accessed first to access the next node (so difficult to pipeline). Faster access, such as random access, is not feasible. Arrays have better cache locality compared to linked lists. Linked lists are among the simplest and most common data structures. They can be used to implement several other common abstract data types, including lists, stacks, queues, associative arrays, and S-expressions, though it is not uncommon to implement those data structures directly without using a linked list as the basis. The principal benefit of a linked list over a conventional array is that the list elements can be easily inserted or removed without reallocation or reorganization of the entire structure because the data items do not need to be stored contiguously in memory or on disk, while restructuring an array at run-time is a much more expensive operation. Linked lists allow insertion and removal of nodes at any point in the list, and allow doing so with a constant number of operations by keeping the link previous to the link being added or removed in memory during list traversal. On the other hand, since simple linked lists by themselves do not allow random access to the data or any form of efficient indexing, many basic operations—such as obtaining the last node of the list, finding a node that contains a given datum, or locating the place where a new node should be inserted—may require iterating through most or all of the list elements.