In computer science, a stack is a linear data structure that follows a specific order in which operations are performed. The order is most commonly Last In First Out (LIFO), but can also be implemented as First In Last Out. LIFO implies that the element that is inserted last, comes out first and FILO implies that the element that is inserted first, comes out last. (Stack Data Structure, 2023) There are many examples of stacks in real life. These include stacks of plates at a restaurant or a stack of books at the library.

There are two main operations of stacks: Push and Pop. The Push operation adds an element to the stack. The Pop operation removes the most recently added element that has not been removed. A Peek operation can also be implemented. The Peek operation returns the last element without modifying the stack.

A stack is crucial to the computer science field because of compilers. Several programming languages are stack-oriented, meaning they define most basic operations, such as adding two numbers or printing a character, as taking their arguments from the stack, and placing any return values back on the stack. (Stack (abstract data type), 2023) Stacks are also needed to perform a depth-first search on a binary search tree.

Stacks can be implemented using arrays or linked lists. The main advantage of using linked lists is that a stack can grow or shrink according to the needs at runtime. However, using linked lists requires more memory. (Introduction to Stack – Data Structure and Algorithm Tutorials, 2023)

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. The linked list consists of a series of connected nodes. Each node stores the data and a reference to the next node. (Linked List, 2023)

There are three main operations of linked lists: Insert, Delete and Search. The Insert operation inserts data into the list. The Delete operation removes data from the list. The Search operation searches the list for a specified key. The Insert and Delete operations can be used at the beginning, at the end, or after a given node. (What is Linked List, 2023)

Linked lists have many uses in the field of computer science. As mentioned above, linked lists can be used to implement stacks. Linked lists can also be used to implement hash tables. Each bucket of the hash table can be a linked list. (What is Linked List, 2023)

In conclusion, linked lists and stacks are essential to the computer science field.

# References

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