OOP project 2

Project 2a Assignment Answers

The following are the identification and description of all data structures used in programming.

Array: A fixed-size collection of elements stored in memory that can be accessed by their index. Arrays are useful for storing data in a compact and ordered manner.

Linked List: A data structure where each element (node) contains a reference to the next element in the list. Linked lists are useful for insertions and deletions, as they can easily change the structure of the list without needing to shift elements.

Stack: A Last In, First Out (LIFO) data structure where elements are added and removed from the top. Stacks are commonly used for managing function calls, tracking program execution, and undo operations.

Queue: A First In, First Out (FIFO) data structure where elements are added to the back and removed from the front. Queues are useful for implementing processes that require order and synchronization, such as task scheduling and message passing.

Tree: A hierarchical data structure where each element (node) has a parent and zero or more children nodes. Trees are commonly used for representing hierarchical relationships, such as file systems, organization charts, and decision trees.

Graph: A data structure representing a collection of nodes and edges that connect them. Graphs are useful for modeling complex relationships and networks, such as social networks, transportation routes, and dependency structures.

Hash Table: A data structure that maps keys to values using a hash function to efficiently store and retrieve data. Hash tables are commonly used for implementing associative arrays, dictionaries, and sets.

Heap: A binary tree data structure where each parent node is less than or equal to its children (min-heap) or greater than or equal to its children (max-heap). Heaps are commonly used for priority queues and heap sort algorithms.

Tree: A tree data structure used for storing a dynamic set of strings where each node represents a single character. Tries are useful for implementing efficient search and retrieval operations for dictionaries and autocomplete features.

Graphical data structures: Includes various data structures used to represent graphical objects and their relationships, such as pixels, vectors, paths, and polygons. These data structures are commonly used in computer graphics, image processing, and visualization applications.