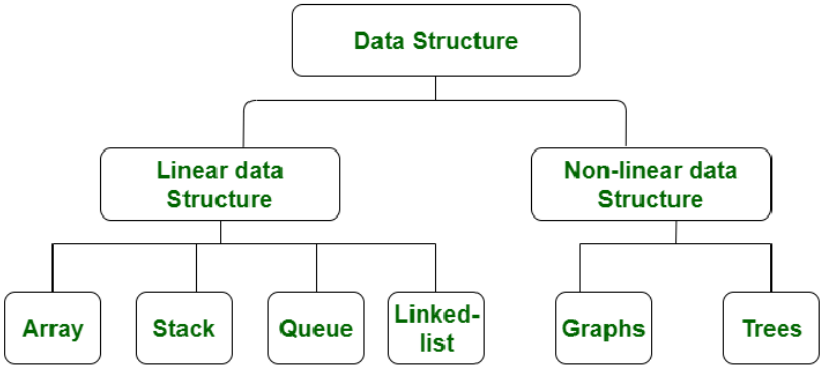
e-Portfolio Activity: Data Structures Reflection

Hero Vired (2023) notes that data structures, the backbone of computer science, are theoretical concepts and practical tools for organising, accessing, processing, and storing data. They come in different types, such as linear, dynamic, and non-linear. Linear data structures, for instance, are not just about mathematical computations, but they also find applications in image processing, record management, and even box ordering, making them a crucial part of our everyday digital lives.

Strings, for instance, are not just a simple array of characters. They are used for complex tasks such as spam email detection, plagiarism detection, digital forensics, search engines, information retrieval systems, and spell checkers. Linked lists, another sequence data structure, connect elements via links and are used for memory management, display image containers, and display social media feeds. With their specific order in operations, stacks are used in browsers and smartphone call logs. Following a FIFO order, Queues are used in CPU task scheduling, printers, and ticket windows. Graphs, nonlinear data structures with vertices and edges, are used to solve complex programming problems. Machine learning (ML) decision-based algorithms use trees to represent hierarchical relationships between data elements. They are also used in DNS servers, chess games, and Java objects (Hero Vired, 2023).



(Hero Vired, 2023).

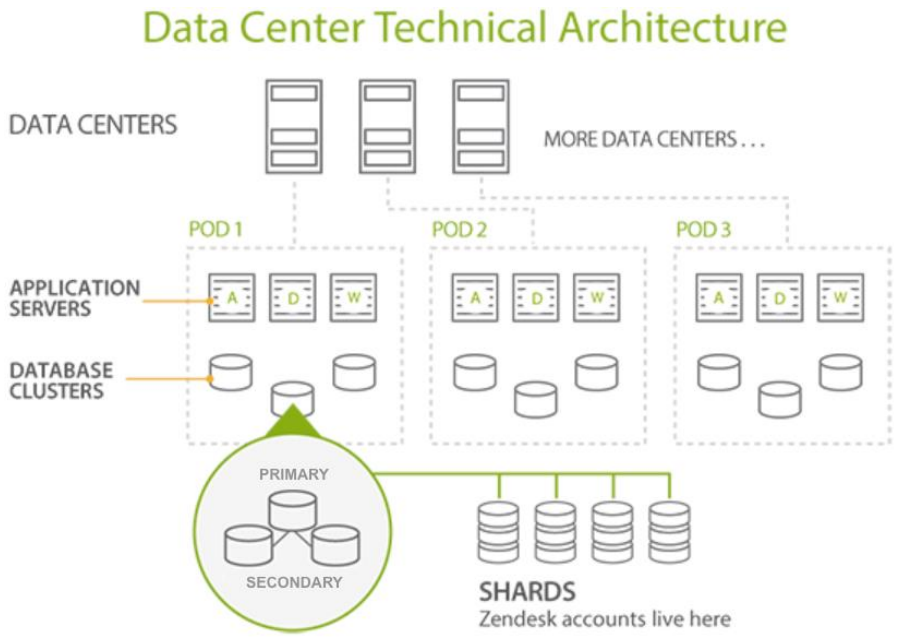
Data Structures is a pivotal course in Computer Science that imparts knowledge about abstract data types. It covers various data structures, such as stacks, queues, lists, trees, maps, and graphs (Dicheva & Hodge, 2018). Learning data structures can be daunting, and visualisation tools have shown limited effectiveness. Hence, active learning is crucial, and educational games have emerged as a promising method for engaging students. However, only some educational games specifically teach data structures, especially the Stack data structure. To bridge this gap, Dicheva & Hodge (2018) created the Stack Game, an interactive educational game that helps students learn stacks.

According to Kushtagi (2023), databases like Oracle, MySQL, Cassandra, and CouchBase use storage engines for data storage, search, and retrieval. Two types are log-structured (LSM Trees) and page-oriented (B-Trees). Log-structured engines optimise read operations by reducing file search, while page-oriented engines divide data into fixed-size pages for efficient retrieval. The choice between LSM trees and B-trees depends on application requirements and workload characteristics.

As I reflect on a system I use daily, I can't help but think about my interactions with Zendesk, which has become an essential part of my life. The power of data structures strikes me as I consider the seamless browsing experience on my internet browser or the efficient online ticket management.

Zendesk is a software platform businesses use to provide technical support, troubleshoot issues, and manage multiple tickets simultaneously (Zendesk, 2020). According to Zendesk (N.D.), all the data and code for the services are located on a central server that stores information in a database. A database is an object, an

instance of a computer program that stores data, consisting of data and a schema that defines the data's structure.



(Zendesk, N.D.)

Object-oriented programming manipulates data from a collection, such as a job queue or events on an event list. This is typically done in a specific application, where the collection is an instance of a class, and the algorithms are instance methods. This suggests a general programming construct: an abstract data type for the collection and a set of subprograms that implement the algorithms (Loshin, 2021).

Arrays are an example of robust data structures that power the functionality of the ticket system on Zendesk platforms. Hash tables are also indispensable for managing tickets and ensuring quick and accurate access to customers' needs (Aslanyan, 2023). Trees are hierarchical structures in computer science used for efficient data access, flexibility, and diverse variants in file systems, organisational charts, and game trees. For instance, the Zendesk platform might use a tree structure to sort events under a ticket (Profits, 2023).

The selection of data structures is not just a technical decision but a critical one that can significantly impact the performance of online systems. Choosing the proper structure, such as a hash table for quick lookups, can ensure smooth system operation, even when handling massive amounts of data and user requests (Alfie, 2024).

Understanding data structures provides a deeper appreciation for the intricate machinery that powers our daily online interactions. So, the next time I navigate the Zendesk system, I will take a moment to reflect on the crucial role that data structures play in making it all possible.

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