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BIG DATA ANALYTICS: ASPECTS OF APPLYING IN INTELLIGENT TRANSPORT SYSTEMS

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A data structure is a specific format for the organisation, processing, retrieval, and storage of information. Multiple fundamental and advanced data structures are available, each designed to structure data to meet particular requirements. Data structures simplify the access and usage of the information required by users. Of utmost importance, data structures gather and organize information to improve the comprehension by both humans and machines.

In computer science and computer programming, a data structure may be selected or designed to store data for the purpose of using it with various algorithms. In some cases, the algorithm's basic operations are tightly coupled to the data structure design. Each data structure contains information about the data values, relationships between the data, and in some cases functions that can be applied to the data.

In the field of computer science and programming, data structures are designed or selected to store data for use in various algorithms. In some cases, an algorithm's fundamental operations are intertwined with the data structure's construction. Every data structure stores information about the data values, their interrelationships, and sometimes functions that can modify the data.

Software developers use algorithms that are closely related to data structures such as lists, queues, and mappings from one set of values to another. This methodology has broad applications, such as managing datasets in a relational database and developing an index of those datasets employing a binary tree data structure. Some examples of the applications of data structures are presented below.

Data storage. Data structures enable efficient data preservation by defining a set of attributes and associated structures for storing records in a database management system.

Management of Resources and Services. Core resources and services of the operating system are facilitated through the implementation of data structures like linked lists for memory allocation, management of file directories and file structures, along with queues for scheduling processes.

Data exchange. Data structures determine the arrangement of information that is exchanged between applications, such as TCP/IP packets.

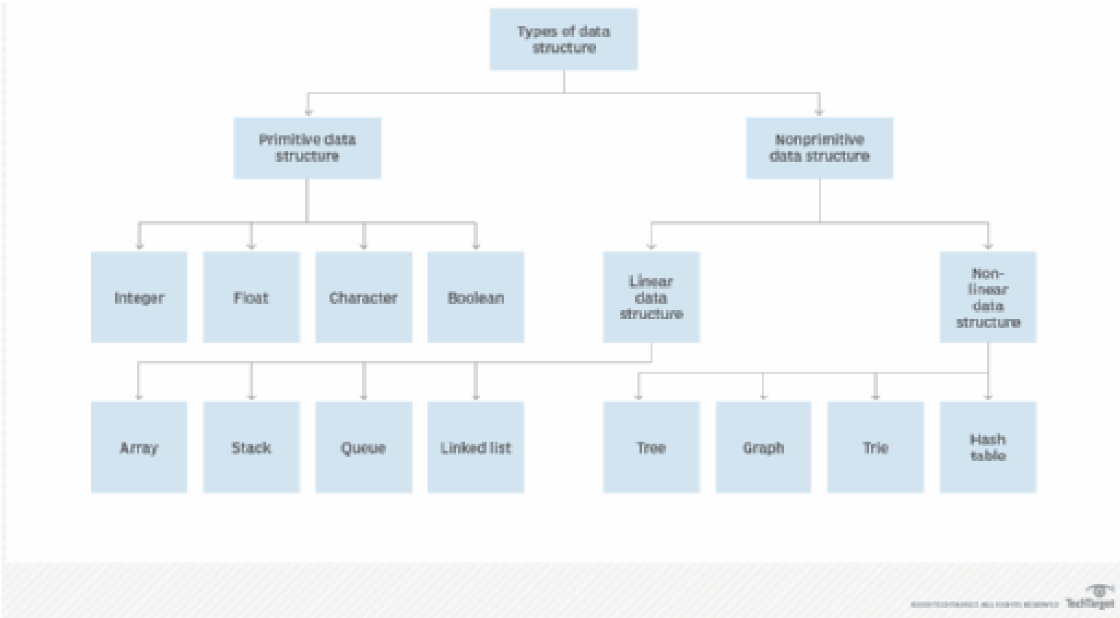

Figure 1. Data Structure Design

Binary search trees – also known as ordered or sorted binary trees – offer efficient methods for sorting objects such as character strings used as tags. Data structuring enables ordered collections. Priority queues enable programmers to manage items prioritised according to specific rules. More advanced indexing of data structures, such as B-trees, accommodates objects stored in databases.

Searching. Index creation with binary search trees, B-trees, or hash tables enhances the ability to locate a particular and desired item.

Scalability. Big data applications utilise data structures to allocate and manage data storage across distributed locations, ensuring scalability and optimal functioning. Specific big data programming environments, Apache Spark, for example, offer data structures that mirror the underlying structure of database records to simplify query processes.

As more and more organisations adopt big data platforms, it is increasingly worrying that application development could be negatively impacted by the lack of good practices in managing the data that drives these applications. When discussing big data management in relation to platforms such as those that combine commodity hardware with Hadoop, it is evident that unique data management tools and processes are required due to the advent of big data technologies.

This is the heart of the matter. Any comprehensive big data management plan should involve technology for stream processing that scans, filters, and chooses relevant information for retention, storage, and future retrieval.

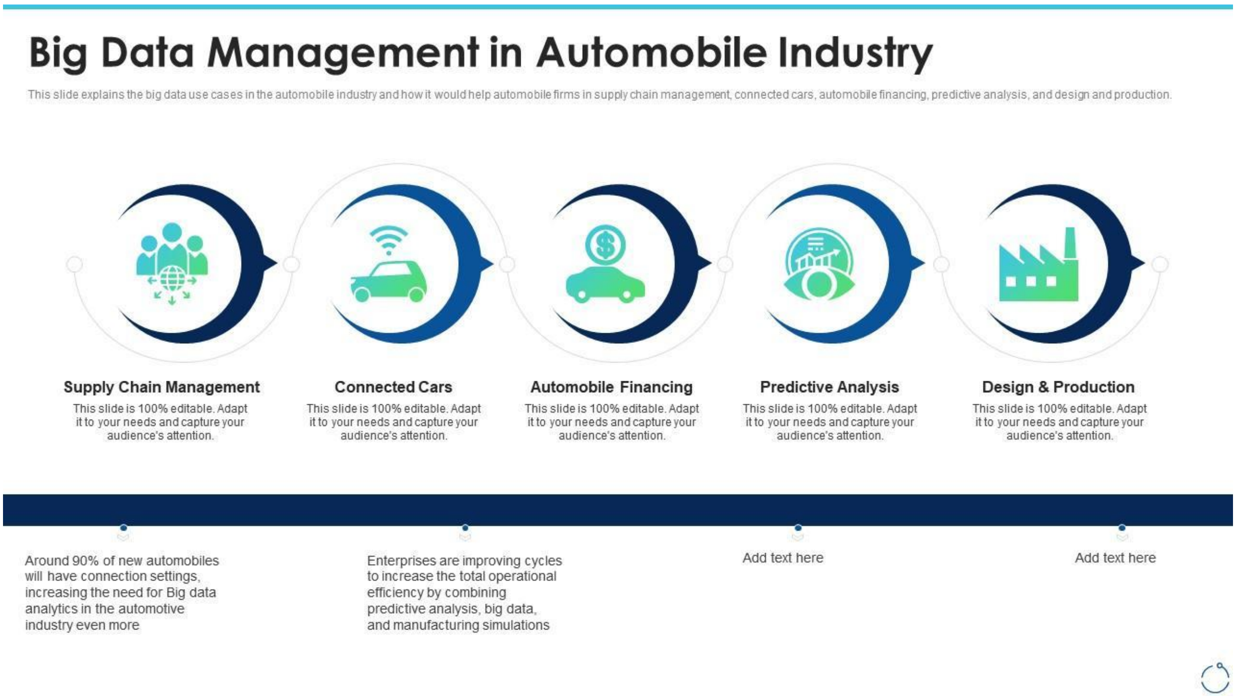

Figure 2. Example of Big Data Management in Automobile industry

Managing large amounts of data not only includes many traditional methods of data modelling and architecture but also requires a range of new technologies and procedures to facilitate wider data accessibility and usefulness. A strategy for big data management should incorporate instruments that allow for the identification and preparation of data, self-service data access, collaborative management of semantic metadata, standardisation and cleansing of data, as well as stream processing engines. Awareness of these implications can significantly accelerate the time-to-value of your big data.

The rise of Big Data intensifies the conflict between its potential advantages and privacy risks, elevating the stakes for both sides. Failure of a project can result from various factors such as inadequate management, financial mismanagement, or insufficient proficiency. However, big data initiatives carry distinct risks of their own. It is unsettling to note that barely 13% of companies can successfully implement their proprietary big data projects.

The low success rate of big data projects should raise concerns for organisations, particularly as many businesses adopt these initiatives without a clear grasp of their return on investment (ROI).

The utilisation of big data empowers designers to create web applications that are notably more engaging and efficient in conveying valuable information to users.

As an increasing number of businesses rely on the Internet to promote their products and services, big data can help their managers in making better decisions. However, to analyse and understand the data, they need the appropriate tools and skills.

Our understanding is that we can create any computer application, provided that we have well-designed data in addition to the application structure.

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