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Department of Information Technology

# Advanced Data Structures

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Subject: Advanced Data Structures

Year & Semester: II - I

Topic: Hashing

Conventional Methods: Chalk & Talk

Teaching Methodology: Video Demonstration

The topic of "Hashing Techniques" is very important in Advanced Data Structures. There is a need to explain this topic using innovative teaching technique. Video Demonstration is used to explain the topic effectively.

References:

1. https://www.youtube.com/watch?v=KW0UvOW0XIo
2. https://www.knowledgehut.com/blog/programming/hashing-in-data-structure

Hashing in the data structure is used to quickly identify a specific value within a given array. It creates a unique hash code for each element in the array and then stores the hash code instead of the actual element. This topic is explained with Video demonstration of NPTEL video.

**Hashing Techniques**

Hashing is an important data structure designed to solve the problem of efficiently finding and storing data in an array. For example, if you have a list of 20000 numbers, and you have given a number to search in that list- you will scan each number in the list until you find a match.The hash function in the data structure verifies the file which has been imported from another source. A hash key for an item can be used to accelerate the process. It increases the efficiency of retrieval and optimizes the search. This is how we can simply give hashing definition in data structure. It requires a significant amount of your time to search in the entire list and locate that specific number. This manual process of scanning is not only time-consuming but inefficient too. With hashing in the data structure, you can narrow down the search and find the number within seconds.

Hashing in the data structure is a technique of mapping a large chunk of data into small tables using a hashing function. It is also known as the message digest function. It is a technique that uniquely identifies a specific item from a collection of similar items. It uses hash tables to store the data in an array format. Each value in the array has been assigned a unique index number. Hash tables use a technique to generate these unique index numbers for each value stored in an array format. This technique is called the hash technique.

**Hash Function**

The hash function in a data structure maps the arbitrary size of data to fixed-sized data. It returns the following values: a small integer value (also known as hash value), hash codes, and hash sums. The hashing techniques in the data structure are very interesting, such as:

**hash = hashfunc(key)**
**index = hash % array_size**

The hash function must satisfy the following requirements:

- A good hash function is easy to compute.
- A good hash function never gets stuck in clustering and distributes keys evenly across the hash table.
- A good hash function avoids collision when two elements or items get assigned to the same hash value.
- One of the hashing techniques of using a hash function is used for data integrity. If using a hash function one change in a message will create a different hash.

The three characteristics of the hash function in the data structure are:

- Collision free
- Property to be hidden
- Puzzle friendly

**Explaining "Hashing Techniques" topic using Video Demonstration:**