

# DATA STRUCTURES REPORT

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Project Topic:

# IPFS SYSTEM

### **Project Description:**

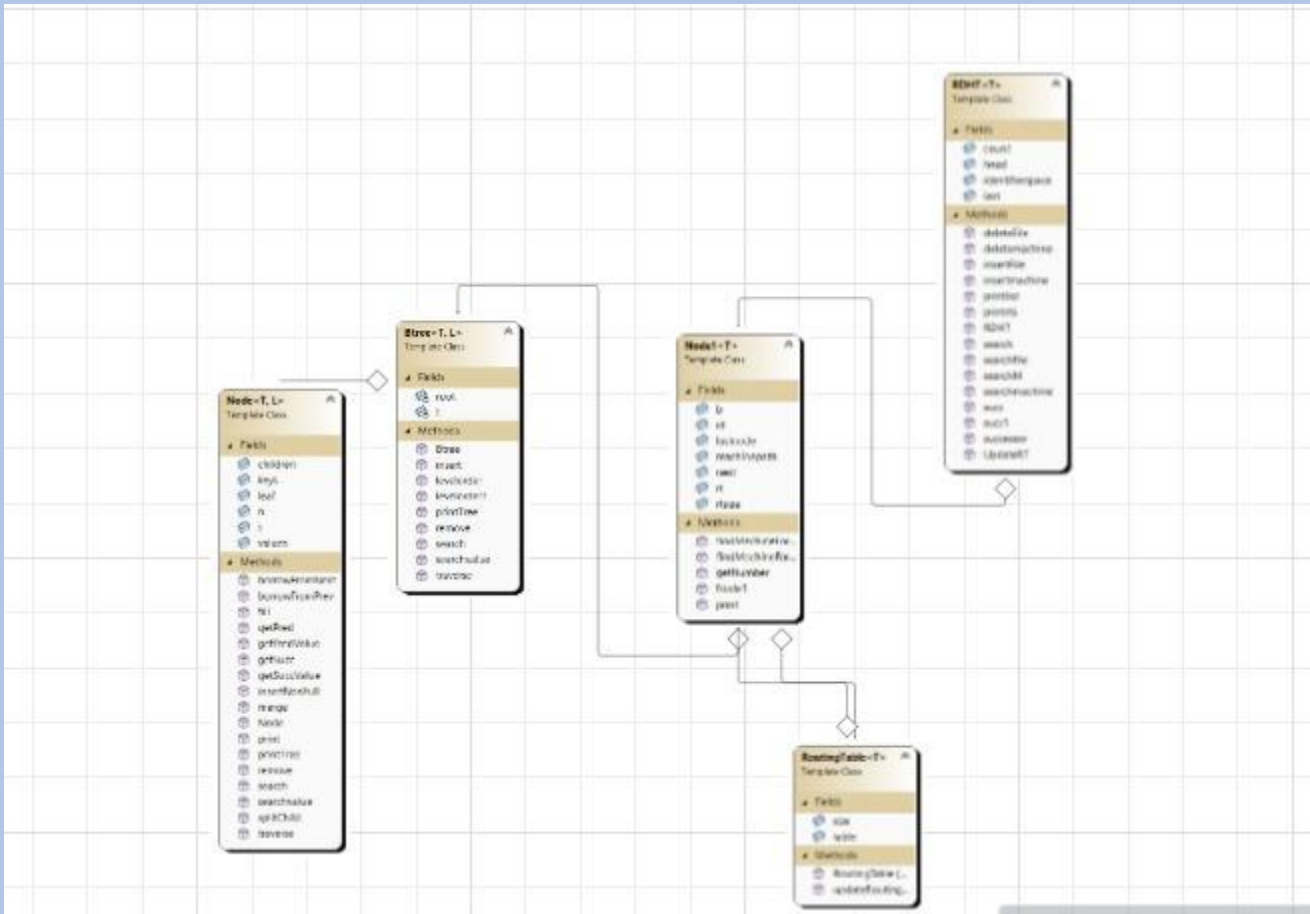
In this project, we were required to implement a special type of Distributed Hash Table (DHT) called Ring DHT using C++ in Visual Studio 2022. The Ring DHT uses a 160-bit circular identifier space and is responsible for storing and retrieving data (IPFS files) across multiple machines geo-distributed across the internet. Our implementation has allowed for the configuration of the identifier space size, support the addition and removal of machines without disrupting the functionality of the Ring DHT, and provide options to insert and remove files, print the routing table of any machine, and display the complete path taken by requests. Additionally, we have submitted a well-documented code and a document highlighting the design in terms of relationships/associations between different classes of your program.

### **Components Required:**

Following Libraries have been used in the making of project:

- CryptoPP library (for SHA-1)
- Iostream library
- Fstream library
- String library
- Sstream library
- Filesystem library
- Cstdio library
- Queue library
- Math.h library
- Thread library
- Chrono library
- BigInt (Self Implementation)

## Class Diagram:



## Simulation Results:

## DATA STRUCTURES PROJECT REPORT

```
Enter Identifier Space : 5
Enter Order of B-Trees : 5
||==== Distributed Hash Table Menu ====||
||1. Insert Machine                      ||
||2. Insert File                        ||
||3. Delete Machine                    ||
||4. Search for File                  ||
||5. Delete File                      ||
||6. Print List of Machines           ||
||7. Print Routing Table of a machine ||
||8. Print B-Tree of a machine        ||
||9. Exit                            ||
||=====||
Enter your choice: 1
Enter Number of Machines you want to enter : 1
Enter Machine Name : hafdhfga
Press 0 if you want to manually assign ID and 1 if you want to automatically assign id's
1
Binary of Hashed Key is (160 bits) :10110101000101000011101000101110110010011110100011010100010001000111111100010101001001000001010011111010001111101100100000100001111010000001001111100011
After Extracting 5 Bits :00011
After Converting These bits to decimal 3
Machine ID : 3
||==== Distributed Hash Table Menu ====||
||1. Insert Machine                      ||
||2. Insert File                        ||
||3. Delete Machine                    ||
||4. Search for File                  ||
||5. Delete File                      ||
||6. Print List of Machines           ||
||7. Print Routing Table of a machine ||
||8. Print B-Tree of a machine        ||
||9. Exit                            ||
||=====||
Enter your choice: 1
Enter Number of Machines you want to enter : 1
Enter Machine Name : kafjhafnkfhaj
Press 0 if you want to manually assign ID and 1 if you want to automatically assign id's
1
Binary of Hashed Key is (160 bits) :100000010011101011010111011111011011111100100101011010101010101010101100011000100000110011100111110000111010001000110100110011011010010001000011010001101
After Extracting 5 Bits :01101
After Converting These bits to decimal 13
Machine ID : 3 Machine ID : 13
```

```
||2. Insert File                      ||
||3. Delete Machine                    ||
||4. Search for File                  ||
||5. Delete File                      ||
||6. Print List of Machines           ||
||7. Print Routing Table of a machine ||
||8. Print B-Tree of a machine        ||
||9. Exit                            ||
||=====||
Enter your choice: 2
Enter path of file you want to store xyz.txt
Binary of Hashed Key is (160 bits) :110111101011001001101000101011101010111001111110100101001111001010100111100111100011100010000010100010011100101111100000010000000001111010001101000101100
After Extracting 5 Bits :10011
After Converting These bits to decimal 19
Machine ID : 2 Machine ID : 3 Machine ID : 13
Enter the machine from which you want to insert file from : 2
File copied to machine folder successfully!
||==== Distributed Hash Table Menu ====||
||1. Insert Machine                      ||
||2. Insert File                        ||
||3. Delete Machine                    ||
||4. Search for File                  ||
||5. Delete File                      ||
||6. Print List of Machines           ||
||7. Print Routing Table of a machine ||
||8. Print B-Tree of a machine        ||
||9. Exit                            ||
||=====||
Enter your choice: 4
Enter File Key to search: 19
Path of requested file is: xyz.txt
```

## Procedure Followed:

- We are making a Ring Distributed Hash Table
- Then we are taking input from the user of the identifying space and order

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- Then we take input how many machine we add in the RDHT
- Then we are adding the machines according to the requirements
- Then we are displaying the menu
- Then we are taking choice as input from the user
- And then performing the relative operation as follows:

```
Enter Identifier Space : 5
Enter Order of B-Trees : 5
||===== Distributed Hash Table Menu =====||
||1. Insert Machine                               ||
||2. Insert File                                 ||
||3. Delete Machine                             ||
||4. Search for File                             ||
||5. Delete File                                 ||
||6. Print List of Machines                       ||
||7. Print Routing Table of a machine             ||
||8. Print B-Tree of a machine                   ||
||9. Exit                                         ||
||=====||
Enter your choice: █
```