

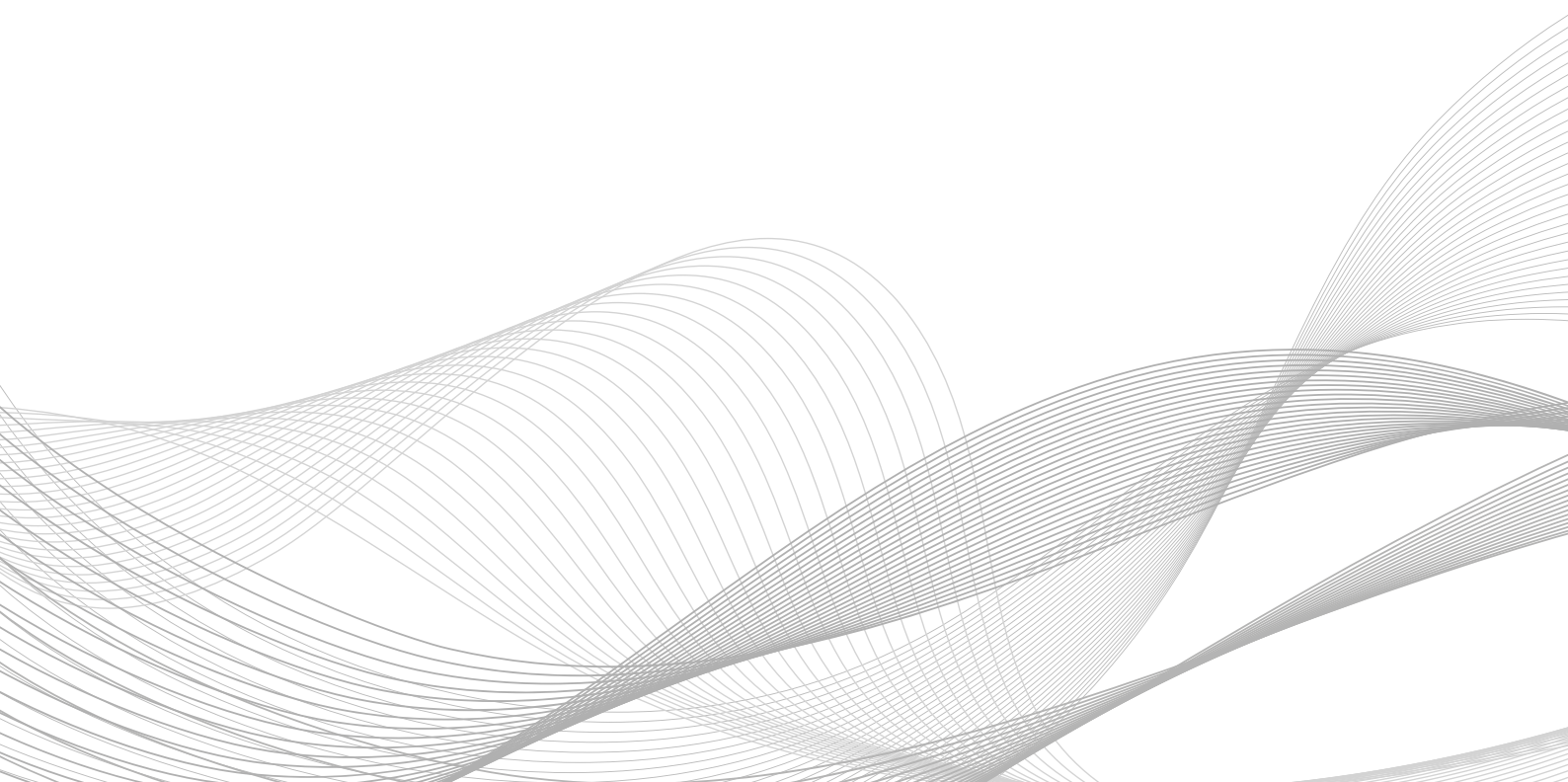
INTER PLANETARY FILE SYSTEM

Data Structures Project



THE CON TENT

- OBJECTIVE
- PROJECT DESIGN
- CLASS RELATIONS
- PROJECT FUNCTIONALITY
- CONTRIBUTIONS



01 Objective

The primary goal of this project centered on the Interplanetary File System (IPFS),with a focus on file-sharing features. One of the main features of IPFS is that, instead of using traditional filenames, files are uniquely identifiable and accessible by their content hash. In addition, the project intends to tackle the difficult problem of data management in a distributed context, requiring the implementation of DHT.

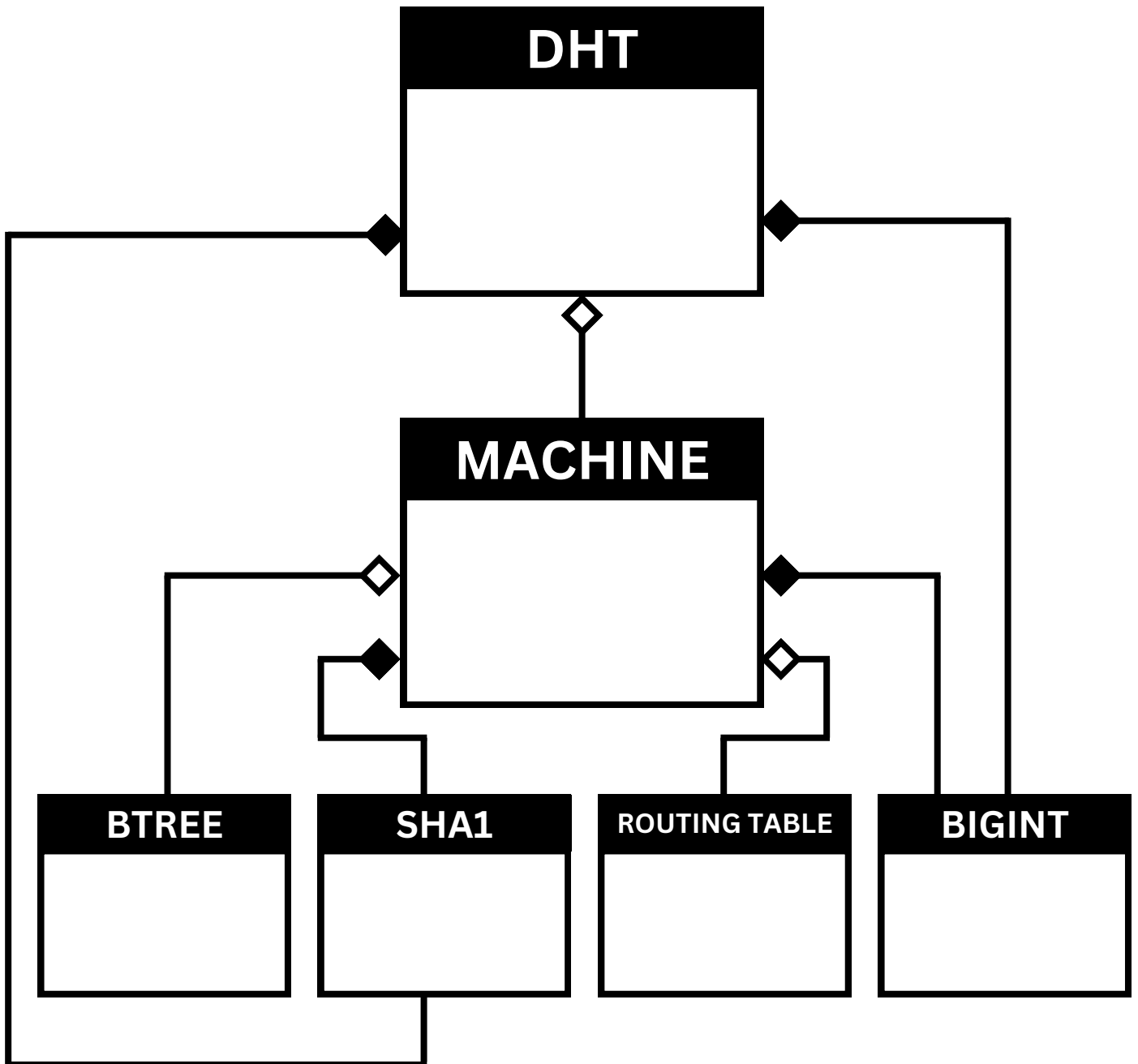
02 Project Design

Our project's design was divided into several classes, the most important of which was the 'DHT' class, which was essential for coordinating data management across the dispersed network.

Key classes utilized in our project include:

- 1.DHT.h
2. network.
- 3.Machine.h
- 4.File.h
- 5.SHA1.hpp
- 6.bTree.h
- 7.BigInt.h
- 8.BigInt.cpp

03 Class Relations



04 Project Functionality

01

The 'DHT' class was essential to managing and arranging the computers on the network. More specifically, it enabled the network machines to be stored as a singly circular linked list. It also made use of an identifier space for tracking and arranging the number of devices connected to the network.

02

Our project's 'Machine' class played an important part in managing key-value pair data storage, which greatly enhanced the functionality of the system.

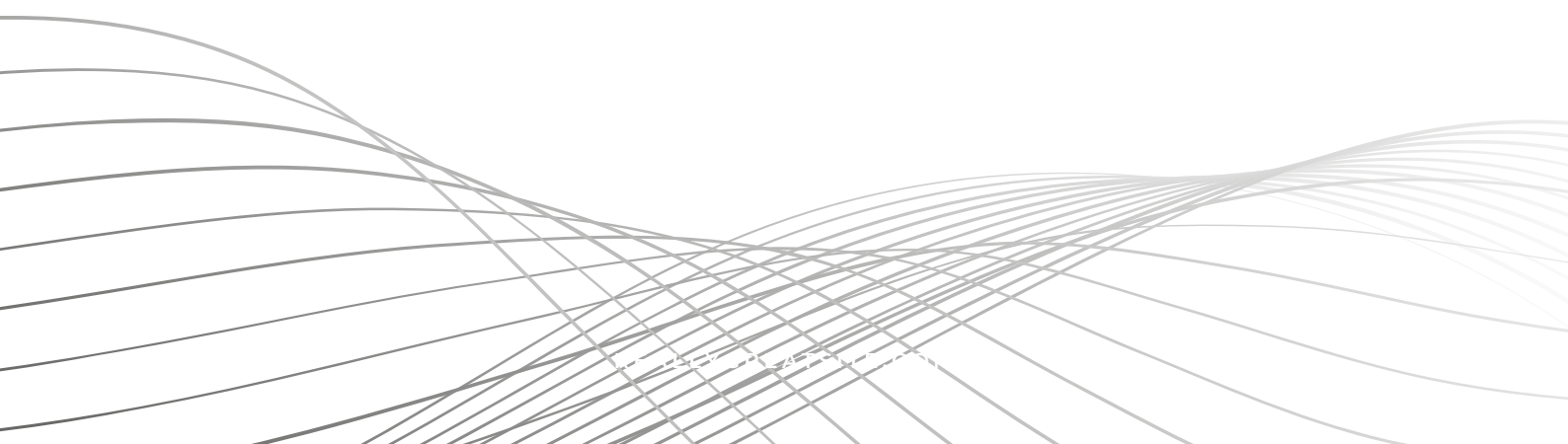
The B-tree data structure was effectively used by this class to store and manage the data. Additionally, it designed a routing table to improve time complexity and optimise search operations, thus optimising the system's search procedures."

03

A key component of our project's data processing was the 'File.h' class. It contained attributes that are special to file management, like name, key, and machineld. The attribute 'key' functioned as a crucial means of identification, facilitating the effective storing and retrieval of information within the system and expediting the search process.

04

In SHA class we used the built-in library to generate the file key using Sha. SHA1 generates key on the basis of the file content. This key is used for the storage and retrieval purposes.

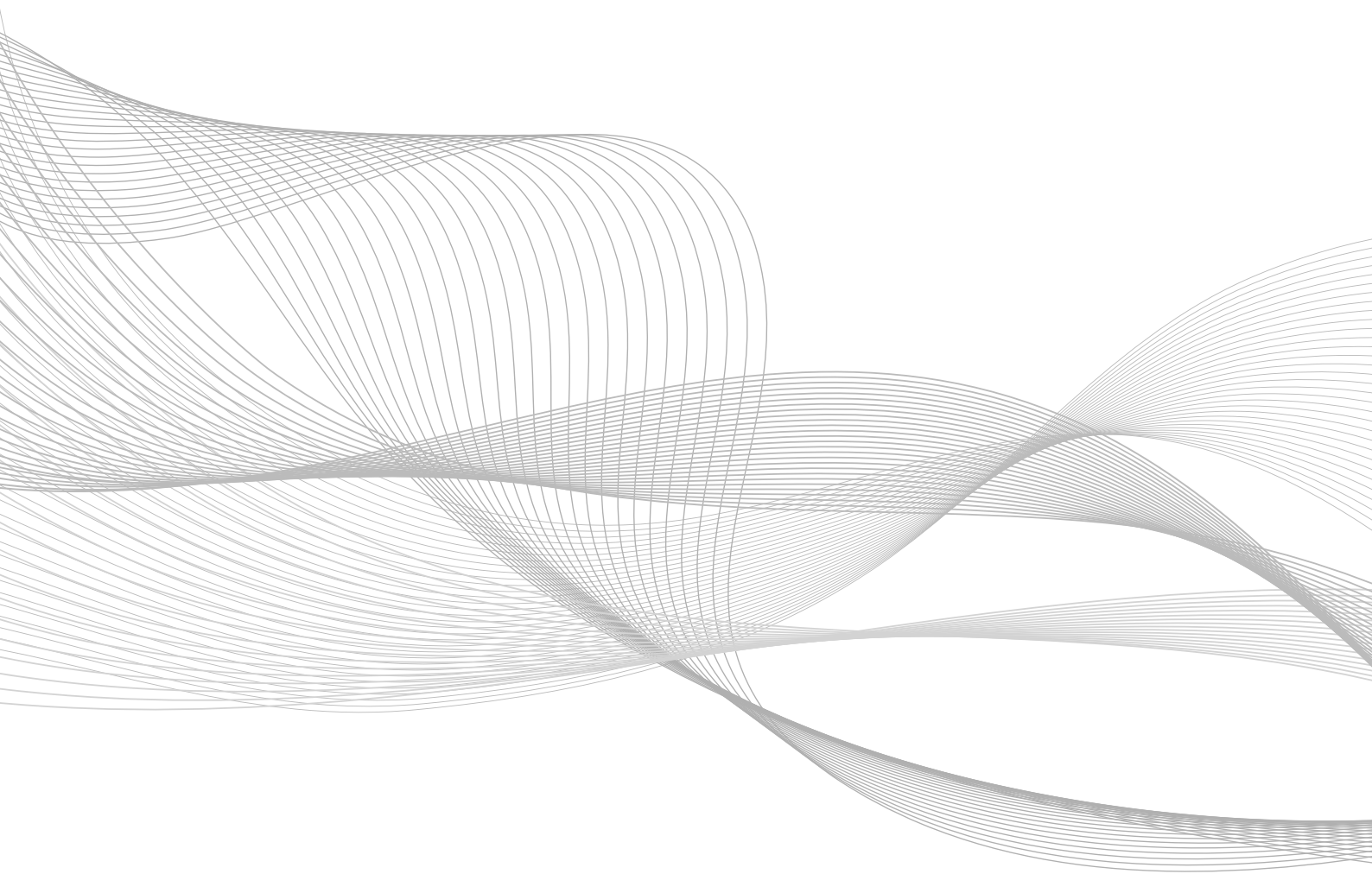


05

The 'Btree' class played a pivotal role in our storage system, specifically dedicated to organizing and managing files based on their unique keys. Its primary function was to facilitate efficient storage, deletion, and search operations based on the file keys. The order of the Btree, crucial for its structure, was taken as input from the user. By employing the B-tree data structure, it ensured organized and optimized file storage, this helped make finding and removing files easier in the system.

06

We implemented bigint functions to handle the sizable identifier space, which spanned 2^{160} bits. This was necessary as working with typical int datatypes would have been challenging. The code for these bigint functions was sourced from the internet after obtaining permission from MS Marium Hida



05 Contributions

The work was divided among the three group members as fairly and efficiently as possible so that none of the group members would be overburdened with work while the others had less work to do. In doing so, the skills of all of the group members were kept in mind.

The project was successfully completed with the help of each and every group member. Ali Asif worked on the functionality of Distributed Hash Table and also linked the Secure Hash Function Library with the system. Progressing further, Hashim Awan worked on BTree functionality creating all the necessary functions for the InterPlanetary File System. Arshaq Kirmani worked on the functionality of the Routing Table and linked it with the DHT Class.

Together with the help and contribution of each group member, it was possible to complete the project with complete functionality.

