**Data Structures**

**Roll No: 19I-0636 19I-0507**

**19I-0515 (dropped the course)**

**Class Diagram:**

**Circular Ring:**

**Circular Ring has an association relationship with Machine.**

Circular ring is the main class where the whole ring functionality is done.

This class is a circular linked list with machine at each node of ring. All the functionality activating the machines, searching data etc. is performed in this circular ring.

In Insert () function, a request is made on a specific active machine and a key is passed along with data as a parameter. We find the machine based on FT tables using hashed key and then, the machine’s Set Values () function is called.

In Search () function, a request is made on a specific active machine and a key is passed as a parameter. We find the machine based on FT tables using hashed key and then, the machine’s Retrieve Data () function is called.

In Delete Data () function, a request is made on a specific active machine and a key is passed as a parameter. We find the machine based on FT tables using hashed key and then, the machine’s Delete Data in Tree () function is called.

**Machine:**

**Machine has composition relationship with AVL Tree.**

**Also, Machine has composition relationship with FT Table.**

Machine has association relationship with Circular Ring. A machine has an AVL tree and a text file. The machine also has a list of Ft Table.

The path of searching is defined in the Ft Table.

In Set Values () function, the parameters are key and data which in turn are passed to Insert Data in Tree () function, which sets the values in AVL Tree using insert function of AVL Tree with parameters root, key and line number at which data is to be stored. Insert Data in Tree () function also stores the data in the specific file.

In Retrieve Data () function, the only parameter is key is passed to pre-Order Find Line () function of AVL Tree to get the line at which data stored in file and then file is opened to get the data at the corresponding line number.

In Delete Data in Tree () function with key as parameter, the whole data written in file is stored in dynamic array of strings. Then, the file is cleared and whole data is inserted back except the data which is obtained using the key in Retrieve Data () function. Key and line number are also deleted from AVL using delete Node () function.

**AVL Trees:**

AVL Tree has a key and a line number. The key and line number against key is stored in AVL Tree.

In Insert () function with key and line number as parameters, key and line number are inserted at their specific location in tree.

In pre-Order Find Line () function, key as a parameter is used to find the stored line number where the key is already is stored.

In delete Node () function, key and line number are deleted from the AVL Tree.

**FT Table:**

FT Table contains the whole track of searching data. FT table has ids of next active machines which is calculated from given formulae.

FT Table has an insert () function to insert value in linked list and a display () function.

The implementation of our project is simple and accurate as per guideline.