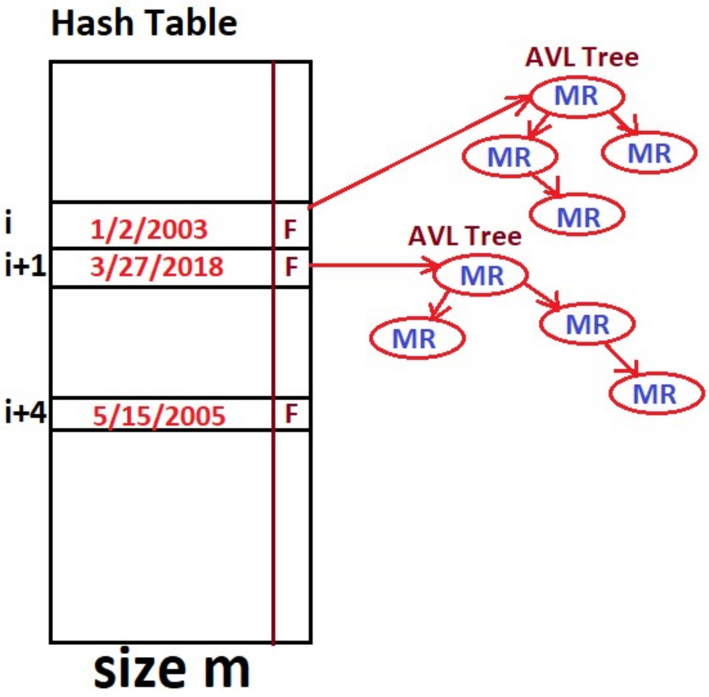
COMP242 ProjectIII

In this project, you will implement a new martyrs' data structure using AVL tree, Hash Table, Queues/Stacks, and Heap. The following figure shows the overall **martyrs** data structure:



Note the following in this data structure:

- **Main Hash Table**: this **hash table** holds unique date records. Each date record in this tree consists of a **date, flag (E: empty, F:full, and D:deleted)** and a **Martyrs AVL tree**. This hash table combines the separate chaining and quadratic probing techniques in one. i.e. if 2 martyrs records has the same date, they both will be inserted into the same hash node's AVL tree. If a new martyr record's date map to a full location in hash table, the quadratic probing technique will be used to find the next empty spot. The initial table size is 11, if half full do rehash/resize the table (e.g. new hash table size = 1st prime after [2 * old hash table size]).
- **Martyrs AVL Tree**: this **AVL** tree holds all martyr records whom died in the same date. The tree is sorted by 2 fields: The district and full name i.e. first we compare by district and if equals we compare by name.

The data input for this project will be a martyrs csv file (**data.csv** attached)
For a good user experience, you will need to implement a graphical user interface (GUI) using javaFX.

When running your project, at first, the user has to load the martyrs file using a **file chooser**. Your program has to read the file line-by-line and fill the **martyrs** data structure appropriately.
Then the user will be provided by the Date screen as follow:

Date Screen:in this screen we need the following:

1. An option to insert new date to the hash table.
2. An option to update a date record.[1]
3. An option to delete a date record.[1]
4. An option to print the hash table **from top to bottom including/excluding the empty spots.**
5. Navigate throw the hash table from top to bottom. The navigation has to have an option to go **up** date and go **down** date). While navigate over dates show the following:
    a. Martyrs' summary (total, average, etc.).
    b. District that has the maximum martyrs
    c. Location that has the maximum martyrs
6. An option to load the current selected date's AVL into martyrs screen.

Martyrs Screen: in this screen we need the following:

1. An option to insert new martyr into AVL tree.
2. An option to update a martyr's info.
3. An option to delete a martyr.[1]
4. An option to show the tree **size** and **height**.
5. An option to print the tree **level-by-level and from right to left.**
6. An option to print the martyrs in a table sorted by age. Use heap-sort to sort by age.

Important:

- To enter dates, use DatePicker. To enter District or Location, choose from a combo box.
- To enter gender use radio buttons
- All the operations should consider the data from the created data structure.
- Add an option to save the updated data structure to a new file in the same format of the input file.

[1] Show a warning and a confirmation dialog before performing this action.