VISVESVARAYA TECHNOLOGICAL UNIVERSITY

JNANASANGAMA, BELGAVI-590018

FS LAB MINI PROJECT REPORT ON

"Student Information Management System"

Submitted in partial fulfillment of the requirements for the 6th Semester

INFORMATION SCIENCE AND ENGINEERING

Submitted by

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Under the guidance of

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2019-2020

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DEPARTMENT OF INFORMATION SCIENCE & ENGINEERING

CERTIFICATE

This is to certify that the FS Mini Project (17ISL68) work entitled

“Student Information Management System”

has been successfully completed by

VIRAL AGHARA 1BI17IS058

of VI semester for the partial fulfillment of the requirements for the Bachelor of Engineering Degree in Information Science & Engineering of the VISVESVARAYA TECHNOLOGICAL UNIVERSITY during the academic year 2019-20.

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Examiners: 1. ..…………………

2. ..…………………

ABSTRACT

This project **"Student Information Management System"** provides us a simple interface for maintainance of student information.It can be used by educational institutes or colleges to maintain the records of students easily. Achieving this objective is difficult using a manual system as the information is scattered, can be redundant and collecting relevant information may be very time consuming. All these problems are solved using this project.

Throughout the project the focus has been on presenting information in an easy and intelligible manner. The project is very useful for those who want to know about Student Information Management Systems and want to develop softwares/websites based on the same concept.

The project provides facilities like online registration and profile creation of students thus reducing paperwork and automating the record genreration process in an educational institution.

ACKNOWLEDGEMENT

We have taken efforts in this project. However, it would not have been possible without the kind support and help of many Faculties. We would like to extend my sincere thanks to all of them.

We highly indebted to **BANGALORE INSTITUTE OF TECHNOLOGY** for their guidance and constant supervision as well as for providing necessary information regarding the project & also for their support in completing the project.

We would like to express my gratitude towards my parents & member of BIT for their kind co-operation and encouragement which help us in completion of this project. Last but not least, many thanks go to the head of the project, Chethana M who have invested their full effort in guiding the team in achieving the goal. We have to appreciate the guidance given by other supervisor as well as the panels especially in our project presentation that has improved our presentation skills thanks to their comment and advices.

We would like to express our special gratitude and thanks to all above mentioned people for giving us such attention and time. Our thanks and appreciations also go to our colleague in developing the project and people who have willingly helped us out with their abilities.

Contents

1. INTRODUCTION

1.1 General Overview

The objective of Student information Management System is to allow the administrator of any organization to edit and find out the personal details of a student and allows the student to keep up to date his profile .It'll also facilitate keeping all the records of students, such as their USN, name, Marks, Attendance etc. So all the information about an student will be available in a few seconds.

Overall, it'll make Student Information Management an easier job for the administrator and the student of any organization. The main purpose of this project is intended to help any organization to maintain and manage its student's personal data

1.2 Problem definition

The Student Information Management System includes various information regarding the Student's. The Student Information Management System needs details of the Student's such as the USN, Student's name, Marks and Attendance. So that they can be kept track of their information.

This project helps to handle this problem in a efficient manner. In this the Student's details are entered i.e. their USN, name, Marks and attendance are being stored us b+tree and in form of text file. This project allow you to insert the student details and searching student details and their details can be edited.

This project also helps to in insertion of data in such way that when searched can be accessed faster.

1.3 Objectives

The main objective is to create a file so that the details of the students can be recorded and maintained and used to view and search the detail of the students. This project is all about how to ease the problem of maintaining student data and store in it in systemic way.

The Student Information Management System facilitates the data storing, creating a file for that data , deleting and updating this data , adding other tree ,searching the data , etc . The main aim was to create a graphical user interface so that the user can effectively interact with system and to implement the file handling using the concepts of B+Tree so that the Student’s details can be maintained and can be retrieved for the purpose of confirmation.

The record contains the USN, Student’s name, Marks and Attendance for the store ,inserting ,deleting ,updating and searching.

2. HARDWARE AND SOFTWARE REQUIREMENTS

2.1 Hardware requirements

1. Processor: Pentium IV or Core i3, i5, i7, i9.

2. RAM: 2GB or higher.

3. HDD: 40GB or higher.

4. Display: 1024 * 768 Resolution Color Monitor.

5. Keyboard: 104 keys.

2.2 Software requirements

1. Operating System: Windows XP, 7, 8, 10.

2. IDE: Microsoft Visual Studio 2010 or higher version.

- The hardware requirements specified are the hardware components/capacity of the system in which the application is developed and deployed.
- The above software requirements are the necessary software's required to develop the application and the run the application.
- Microsoft Visual Studio is used to develop the application on windows platform.
- The project is developed in C++ language with concepts of File handling and B-Trees.

3. SYSTEM DESIGN

3.1 Context-flow Diagram

The context diagram is used to establish the context and boundaries of the system to be modeled: which things are inside and outside of the system being modeled, and what is the relationship of the system with these external entities.

A context diagram, sometimes called a level 0 data-flow diagram, is drawn in order to define and clarify the boundaries of the software system. It identifies the flows of information between the system and external entities. The entire software system is shown as a single process.

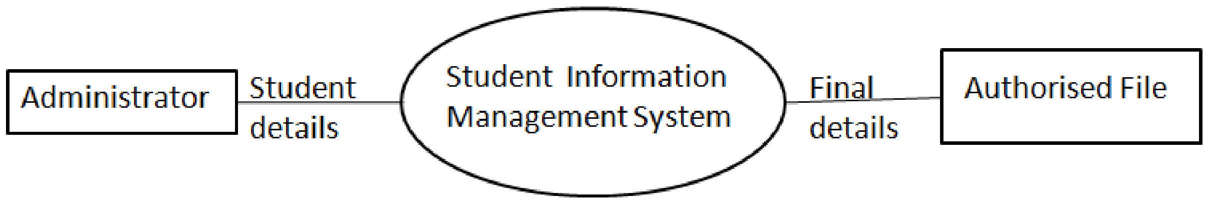


Fig 3.1: Context flow Diagram

3.2 SYSTEM DESIGN

System design is a solution, a “HOW TO” approach to the creation of a new system. It translates system requirements into ways by which they can be made operational. It is a translational from a user-oriented document to a document-oriented programmer. For that, it provides the understanding and procedural details necessary for the implementation. Systems design is the process of defining the architecture, modules, interfaces, and data for a system to satisfy specified requirements.

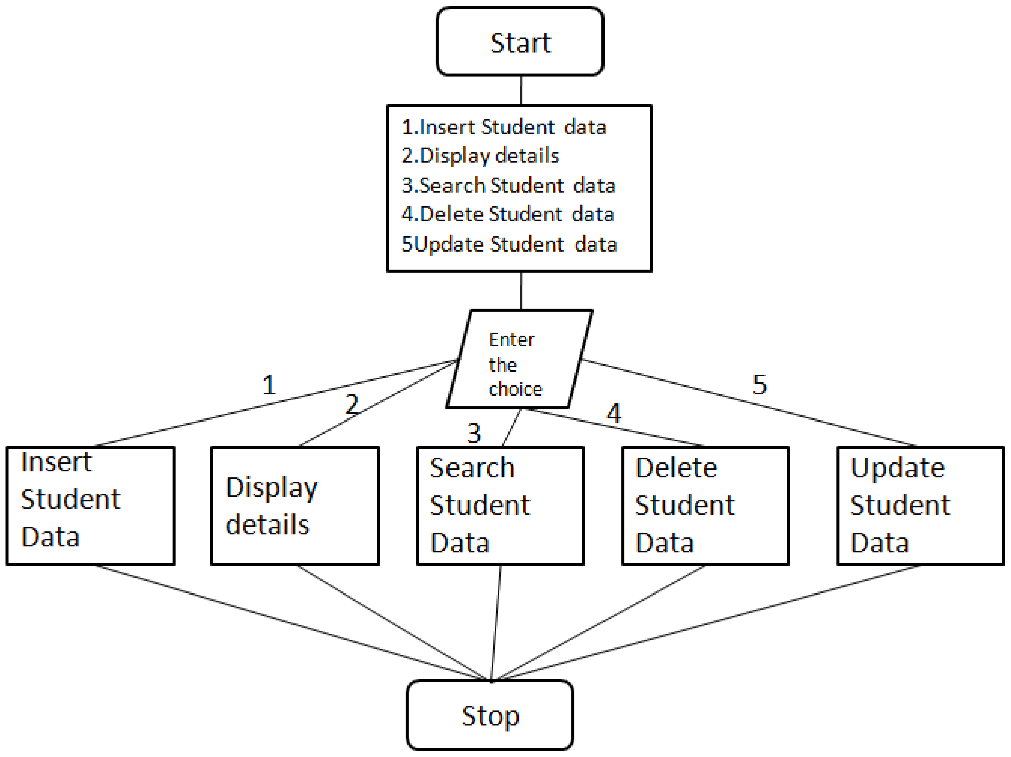


Fig 3.2:System Design for Student Information Management System

3.3 Data-flow Diagram

A data-flow diagram (DFD) is a way of representing a flow of a data of a process or a system. The DFD also provides information about the outputs and inputs of each entity and the process itself. A data-flow diagram has no control flow, there are no decision rules and no loops. Specific operations based on the data can be represented by a flowchart. Data flow diagrams are used to graphically represent the flow of data in an information system. DFD describes the processes that are involved in a system to transfer data from the input to the file storage and reports generation.

3.3.1 Data-flow diagram for insertion

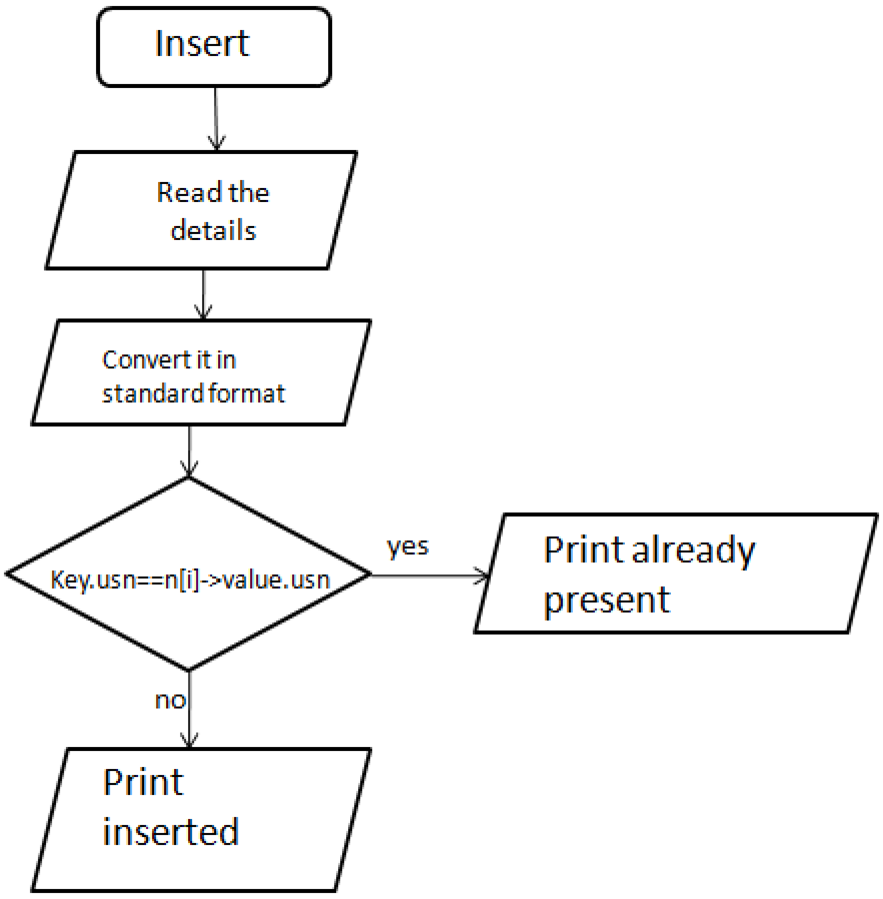


Fig. 3.3: Data-flow diagram for insertion

In the Student Information Management System, the Administrator can insert the details of student’s like USN, Student name, Marks and Attendance. Then the data is validated and checked for errors and converted in standard form, if there are no errors or same usn is not there in list then the data is saved to the tree. The data that is saved in the tree can be accessed later for other use.

3.3.2 Data-flow diagram for search

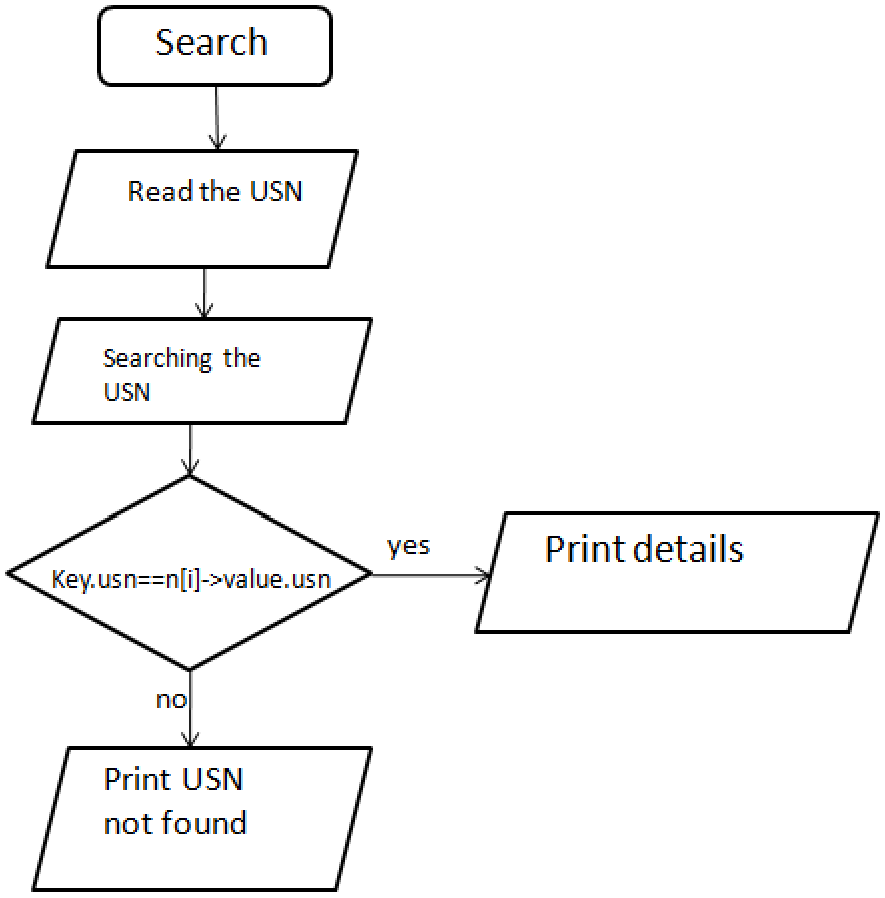


Fig. 3.4: Data-flow diagram for search

In the Student Information Management System, the administration can search the details of student by using UNS, if the USN is present then the system displays that the Student details and displays a message suitably and if the USN is not present then the system will display suitable error message that is ‘USN not Found‘ has to be displayed.

3.3.3 Data-flow diagram for display

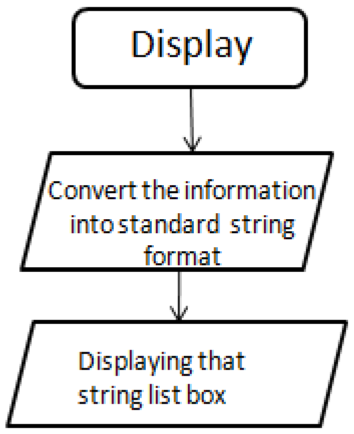

Display
Convert the information into standard string format
Displaying that string list box

Fig. 3.5: Data-flow diagram for display

In the Student Information management System, the Administer can view all the details of the Student. First data is converted into a string and that string is than add to the list box for the displaying the Contain in GUI mode.

3.3.4 Data-flow diagram for delete

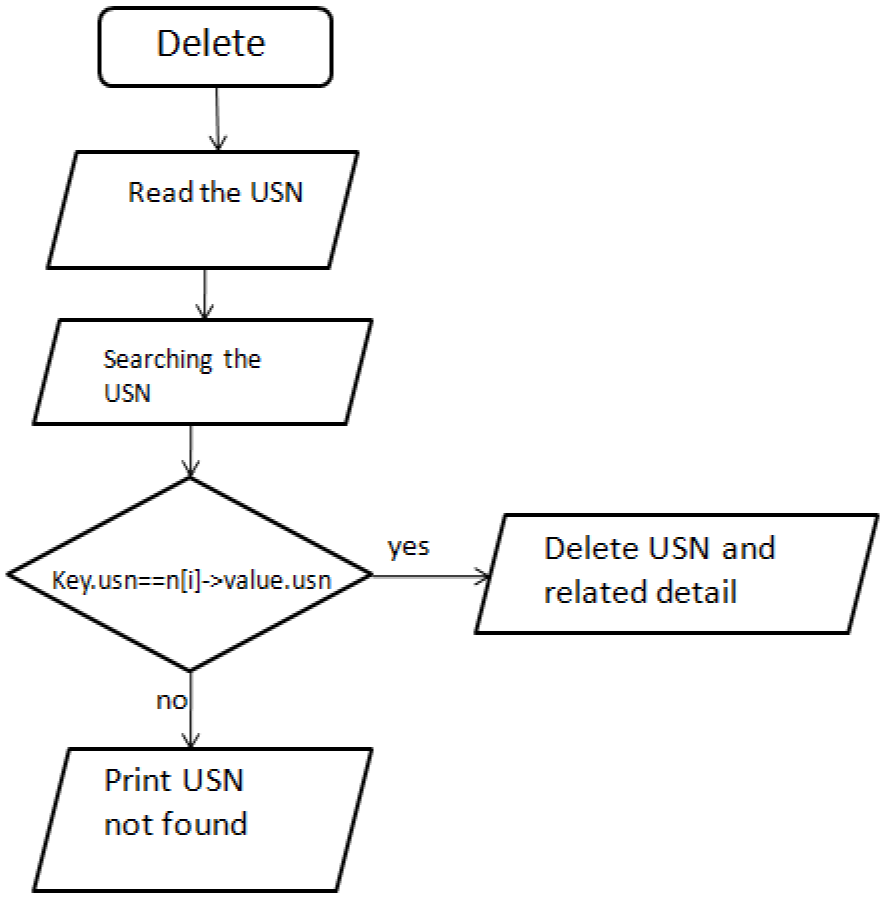


Fig. 3.6: Data-flow diagram for delete

In the Student Information Management System, the administration can delete the details of student by using UNS, if the USN is present then the system deletes that the Student details and displays a message suitably and if the USN is not present then the system will display suitable error message that is ‘USN not Found‘ has to be displayed.

3.3.5 Data-flow diagram for Update

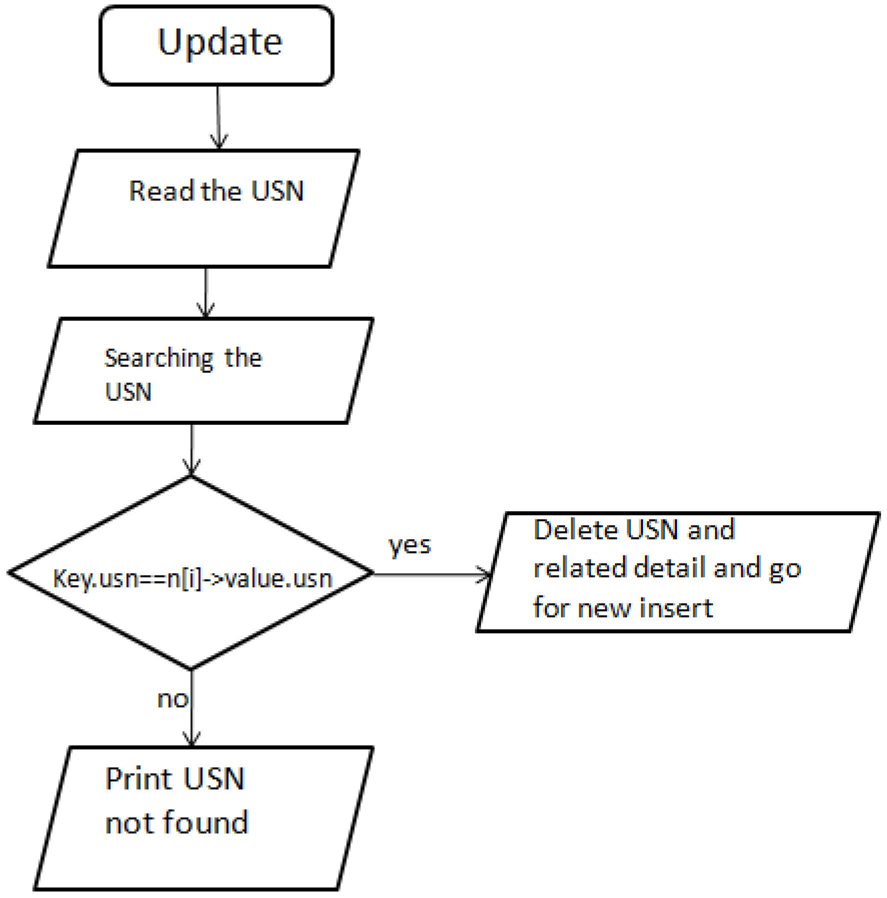


Fig. 3.7 Data-flow diagram for Update

In the Student Information Management System, the administration can Update the details of student by using UNS, if the USN is present then the system replace that the Student details and displays a message suitably and if the USN is not present then the system will display suitable error message that is 'USN not Found' has to be displayed.

4. IMPLEMENTATION

4.1 B+TREE

B+ Tree is an extension of B Tree which allows efficient insertion, deletion and search operations. In B Tree, Keys and records both can be stored in the internal as well as leaf nodes. Whereas, in B+ tree, records (data) can only be stored on the leaf nodes while internal nodes can only store the key values. The leaf nodes of a B+ tree are linked together in the form of singly linked lists to make the search queries more efficient.

B+ Tree are used to store the large amount of data which cannot be stored in the main memory. Due to the fact that, size of main memory is always limited, the internal nodes (keys to access records) of the B+ tree are stored in the main memory whereas, leaf nodes are stored in the secondary memory.

The internal nodes of B+ tree are often called index nodes. A B+ tree of order 3 is shown in the following figure.

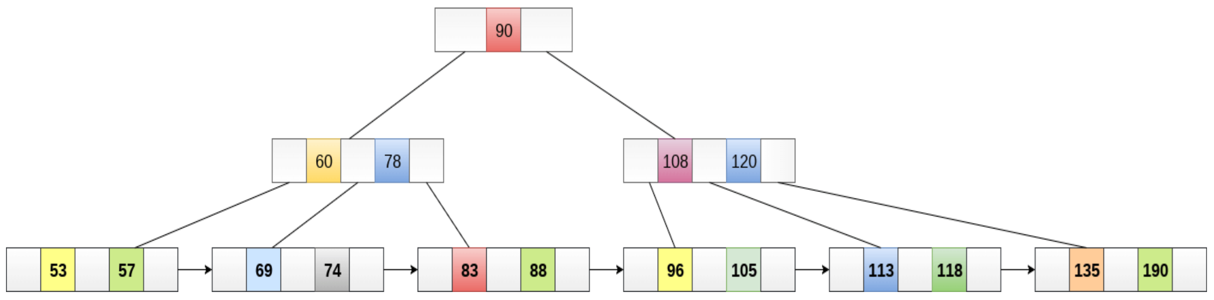


Fig. 4.1:B+ tree

4.2 Rules for B+ Tree

Here are essential rules for B+ Tree.

- Leaves are used to store data records.
- It stored in the internal nodes of the Tree.

- If a target key value is less than the internal node, then the point just to its left side is followed.
- If a target key value is greater than or equal to the internal node, then the point just to its right side is followed.
- The root has a minimum of two children.

4.3 Why use B+ Tree

Here, are reasons for using B+ Tree:

- Key are primarily utilized to aid the search by directing to the proper Leaf.
- B+ Tree uses a "fill factor" to manage the increase and decrease in a tree.
- In B+ trees, numerous keys can easily be placed on the page of memory because they do not have the data associated with the interior nodes. Therefore, it will quickly access tree data that is on the leaf node.
- A comprehensive full scan of all the elements is a tree that needs just one linear pass because all the leaf nodes of a B+ tree are linked with each other.

4.4 B+ Tree vs. B Tree

Here, are the main differences between B+ Tree vs. B Tree

B + Tree	**B Tree**
Search keys can be repeated.	Search keys cannot be redundant.
Data is only saved on the leaf nodes.	Both leaf nodes and internal nodes can store data
Data stored on the leaf node makes the search more accurate and faster.	Searching is slow due to data stored on Leaf and internal nodes.
Deletion is not difficult as an element is only removed from a leaf node.	Deletion of elements is a complicated and time-consuming process.
Linked leaf nodes make the search efficient and quick.	You cannot link leaf nodes.

4.5 Searching a record in B+ Tree

Suppose we want to search 65 in the below B+ tree structure. First we will fetch for the intermediary node which will direct to the leaf node that can contain record for 65. So we find branch between 50 and 75 nodes in the intermediary node. Then we will be redirected to the third leaf node at the end. Here DBMS will perform sequential search to find 65. Suppose, instead of 65, we have to search for 60. What will happen in this case? We will not be able to find in the leaf node. No insertions/update/delete is allowed during the search in B+ tree.

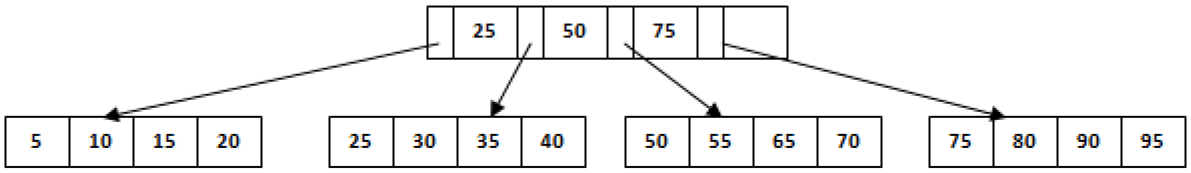


Fig. 4.2: Searching a record in B+ Tree

4.5.1 Search Operation Algorithm

```
1. Call the binary search method on the records in the B+ Tree.
2. If the search parameters match the exact key
        The accurate result is returned and displayed to the user
      Else, if the node being searched is the current and the exact key is not found by the algorithm
        Display the statement "Record cannot be found."
```

Output:

The matched record set against the exact key is displayed to the user; otherwise, a failed attempt is shown to the user.

4.6 Insertion in B+ tree

Suppose we have to insert a record 60 in below structure. It will go to 3rd leaf node after 55. Since it is a balanced tree and that leaf node is already full, we cannot insert the record there. But it should be inserted there without affecting the fill factor, balance and order. So the only option here is to split the leaf node. But how do we split the nodes?

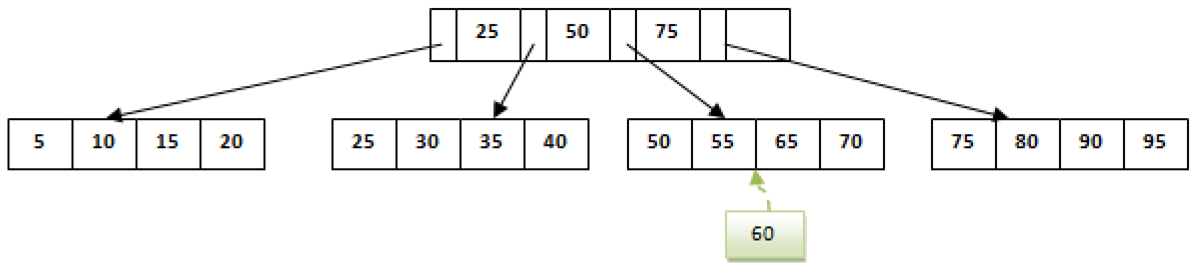


Fig. 4.3: Inserting in B+ tree

The 3rd leaf node should have values (50, 55, 60, 65, 70) and its current root node is 50. We will split the leaf node in the middle so that its balance is not altered. So we can group (50, 55) and (60, 65, 70) into 2 leaf nodes. If these two has to be leaf nodes, the intermediary node cannot branch from 50. It should have 60 added to it and then we can have pointers to new leaf node.

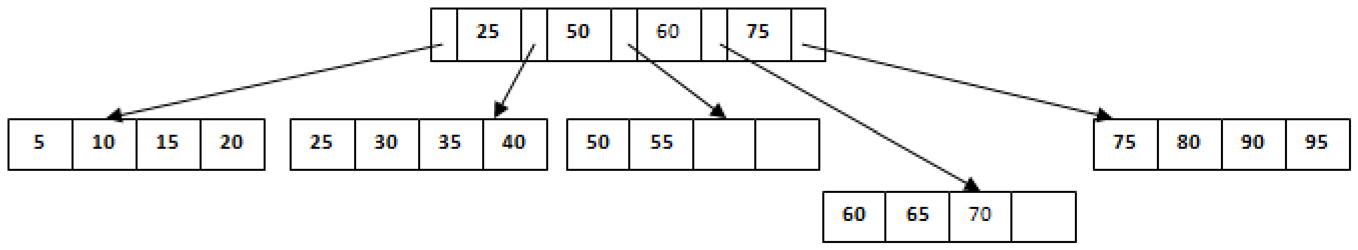


Fig. 4.4: Inserting in B+ tree

This is how we insert a new entry when there is overflow. In normal scenario, it is simple to find the node where it fits and place it in that leaf node.

4.6.1 Insert Operation Algorithm

1.Even inserting at-least 1 entry into the leaf container does not make it full then add the record

2. Else, divide the node into more locations to fit more records.

   a. Assign a new leaf and transfer 50 percent of the node elements to a new placement in the tree

   b. The minimum key of the binary tree leaf and its new key address are associated with the top-level node.

   c. Divide the top-level node if it gets full of keys and addresses.

      i. Similarly, insert a key in the center of the top-level node in the hierarchy of the Tree.

d. Continue to execute the above steps until a top-level node is found that does not need to be divided anymore.

3. Build a new top-level root node of 1 Key and 2 indicators.

Output:

The algorithm will determine the element and successfully insert it in the required leaf node.

5. SOFTWARE TESTING

Software Testing is an empirical investigation conducted to provide stakeholders with information about the quality of the product or service under test, with respect to the context in which respect to the context in which it is intended to operate. Software Testing also provides an objective, independent view of the software to allow the business to appreciate and understand the risks at implementation of the software. Test techniques include, but are not limited to, the process of executing a program or application with the intent of finding software bugs. It can also be stated as the process of validating and verifying that a software program/application/product meets the business and technical requirements that guide its design and development, so that it works as expected and can be implemented with the same characteristics.

5.1 Unit Testing

The software units in a system are modules and routines that are assembled and integrated to perform a specific function. Unit testing focuses first on modules, independently of one another, to locate errors. This enables, to detect errors in coding and logic that are contained within each module. The various controls are tested to ensure that each performs its action as required.
Sometimes software developers attempt to save time by doing minimal unit testing. This is a myth because skipping on unit testing leads to higher Defect fixing costs during System Testing, Integration Testing and even Beta Testing after the application is completed. Proper unit testing done during the development stage saves both time and money in the end.

5.2 Unit Testing Table

S.NO	INPUT	OUTPUT	Remake
1	As the insert operation is used with null and not null characters.	Display appropriate message for null and not null characters.	PASS
2	As the display operation is used with insert and without insert.	Display appropriate message for insert and without insert display.	PASS
3	As the delete operation is used with null and not null characters.	Display appropriate message for null and not null characters.	PASS
4	As the update operation is used with null and not null characters.	Display appropriate message for null and not null characters.	PASS
5	As the search operation is used with null and not null characters.	Display appropriate message for null and not null characters.	PASS

Table 5-1 Unit Testing Table

6. RESULTS

The project is compiled and executed on Microsoft Visual C++. We have put in few screen shots in here to show the working of our Application.

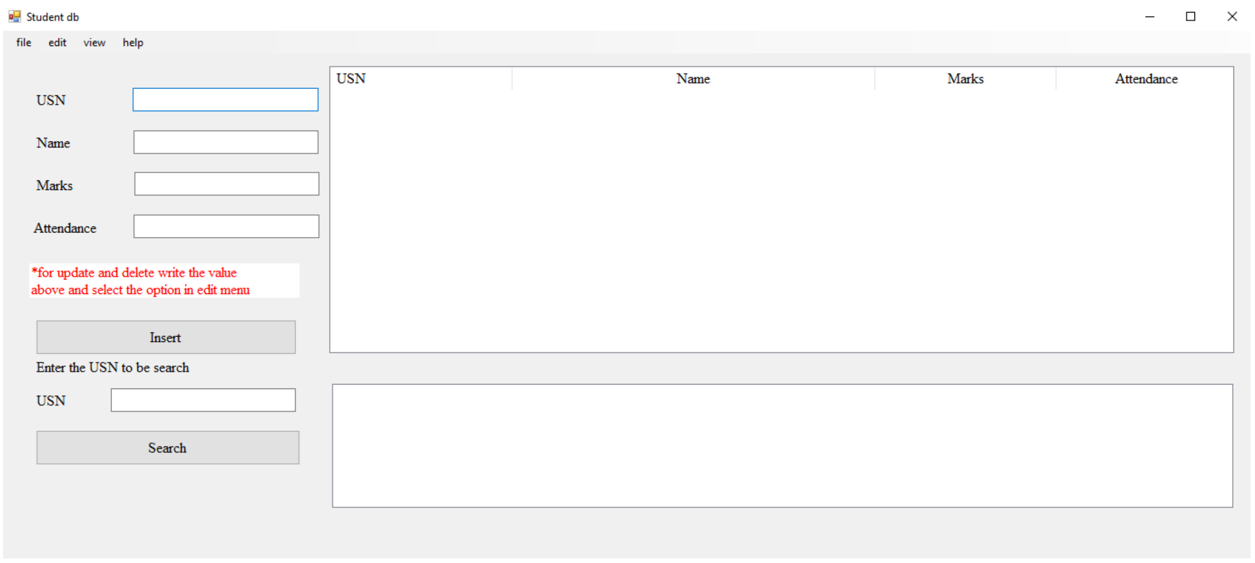
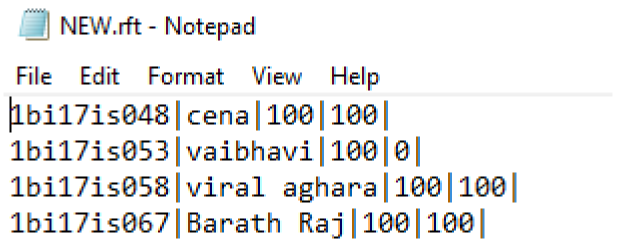

Student db
file edit view help
USN
Name
Marks
Attendance
*for update and delete write the value above and select the option in edit menu
Insert
Enter the USN to be search
USN
Search
USN
Name
Marks
Attendance

Fig. 6.1: Student Information Management System Main display

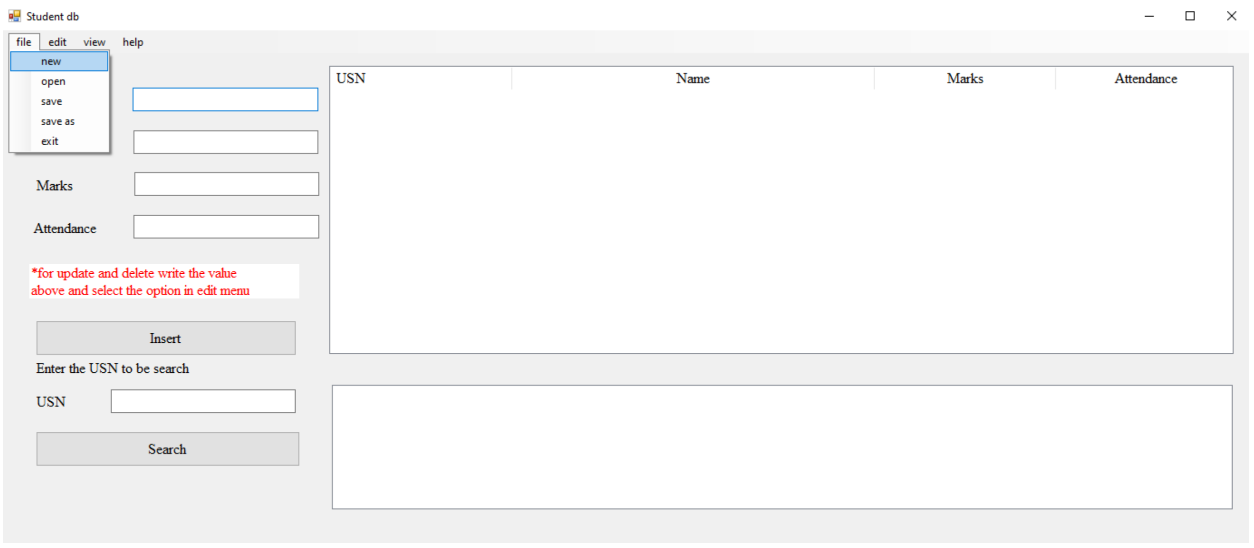
In the Student Information Management System main display page, the administrator can perform various options such as insert a new Student record , searching a student record, display all the record , deleting a student record, update a student record and add a tree to a b +tree record. The administrator can save, open and save as record in .rft format in text file.



```
1bi17is048|cena|100|100|
1bi17is053|vaibhavi|100|0|
1bi17is058|viral aghara|100|100|
1bi17is067|Barath Raj|100|100|
```

Fig. 6.2: File in which the record is stored

In this way the record gets stored in file.



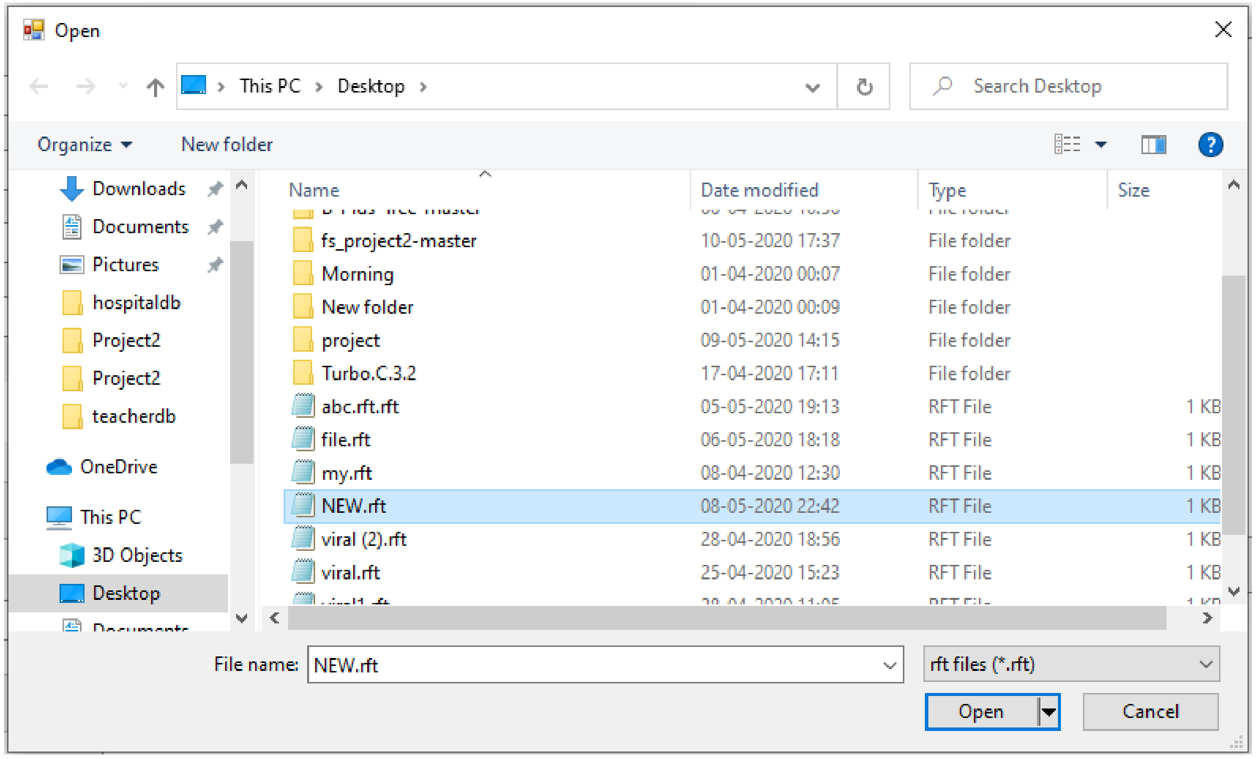
*for update and delete write the value above and select the option in edit menu

Enter the USN to be search

USN

Fig. 6.3: File tab

This is file tab in menu. It contains the options new ,open ,save ,save as and exit option are present .



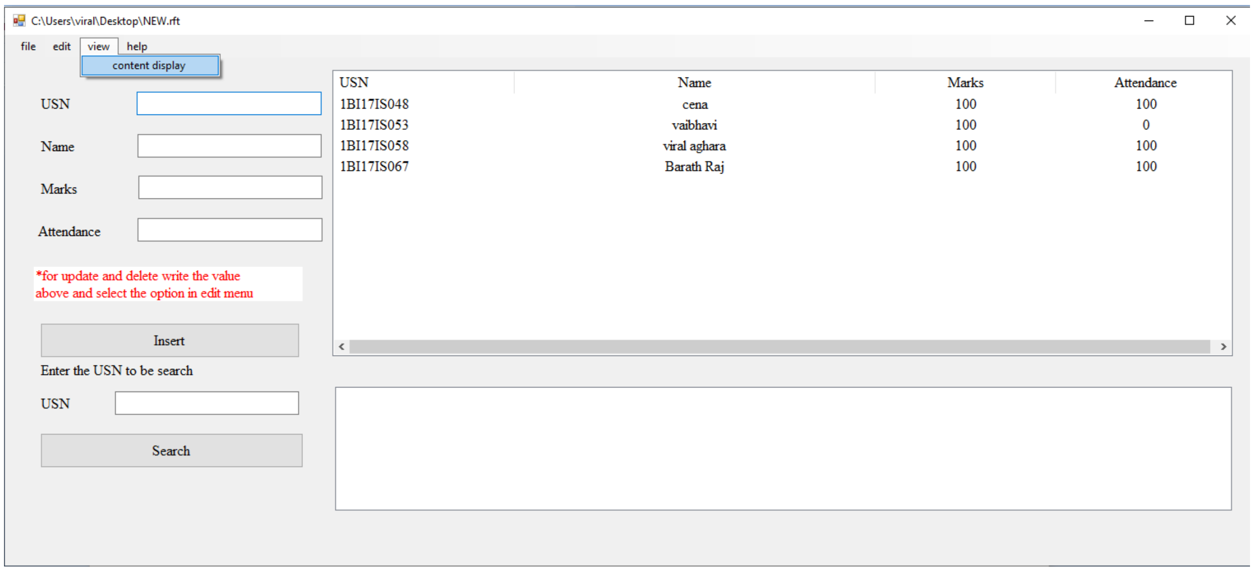
Name	Date modified	Type	Size
fs_project2-master	10-05-2020 17:37	File folder	
Morning	01-04-2020 00:07	File folder	
New folder	01-04-2020 00:09	File folder	
project	09-05-2020 14:15	File folder	
Turbo.C.3.2	17-04-2020 17:11	File folder	
abc.rft.rft	05-05-2020 19:13	RFT File	1 KB
file.rft	06-05-2020 18:18	RFT File	1 KB
my.rft	08-04-2020 12:30	RFT File	1 KB
NEW.rft	08-05-2020 22:42	RFT File	1 KB
viral (2).rft	28-04-2020 18:56	RFT File	1 KB
viral.rft	25-04-2020 15:23	RFT File	1 KB

File name: NEW.rft

rft files (*.rft)

Fig. 6.4 : Open Dialog

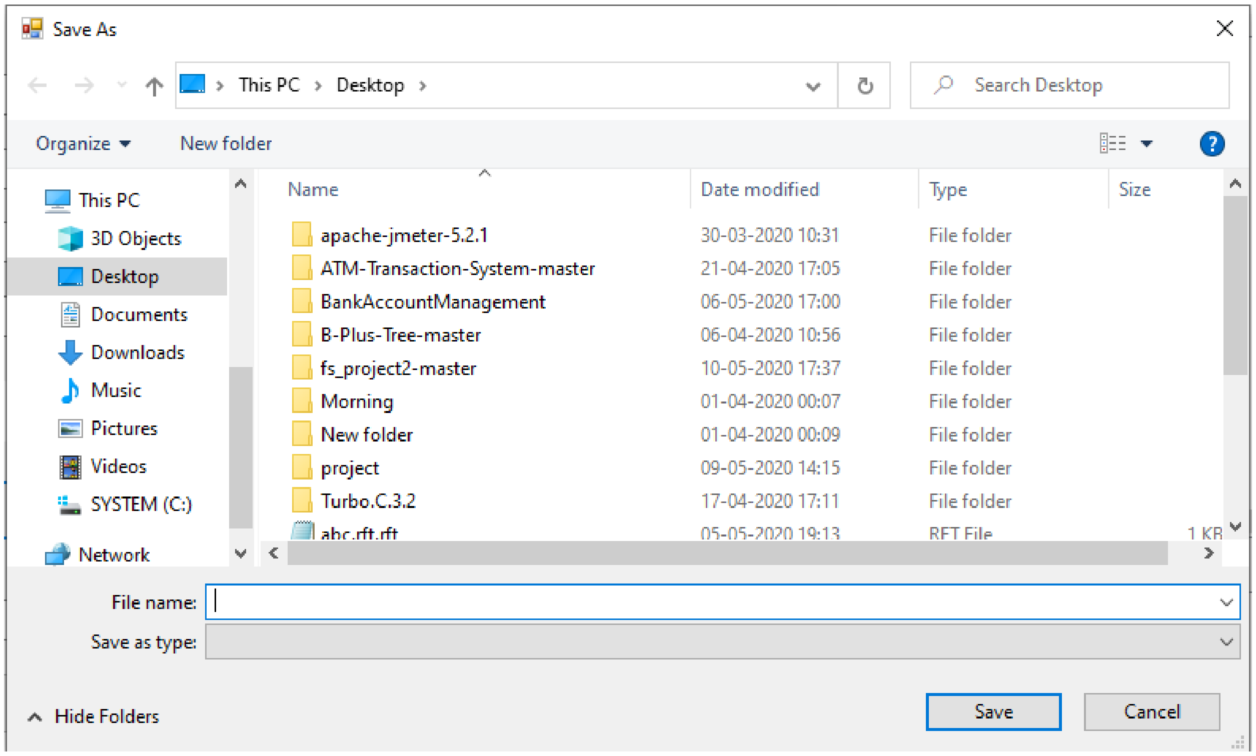
This is a open dialog, it only allows the user to select only .rft this open that file in system and insert all the data in b + tree and can be viewed by content display in view tab


C:\Users\viral\Desktop\NEW.rft
file
edit
view
help
content display
USN
Name
Marks
Attendance
*for update and delete write the value above and select the option in edit menu
Insert
Enter the USN to be search
USN
Search

USN	Name	Marks	Attendance
1BI17IS048	cena	100	100
1BI17IS053	vaibhavi	100	0
1BI17IS058	viral aghara	100	100
1BI17IS067	Barath Raj	100	100

Fig. 6.5: content display

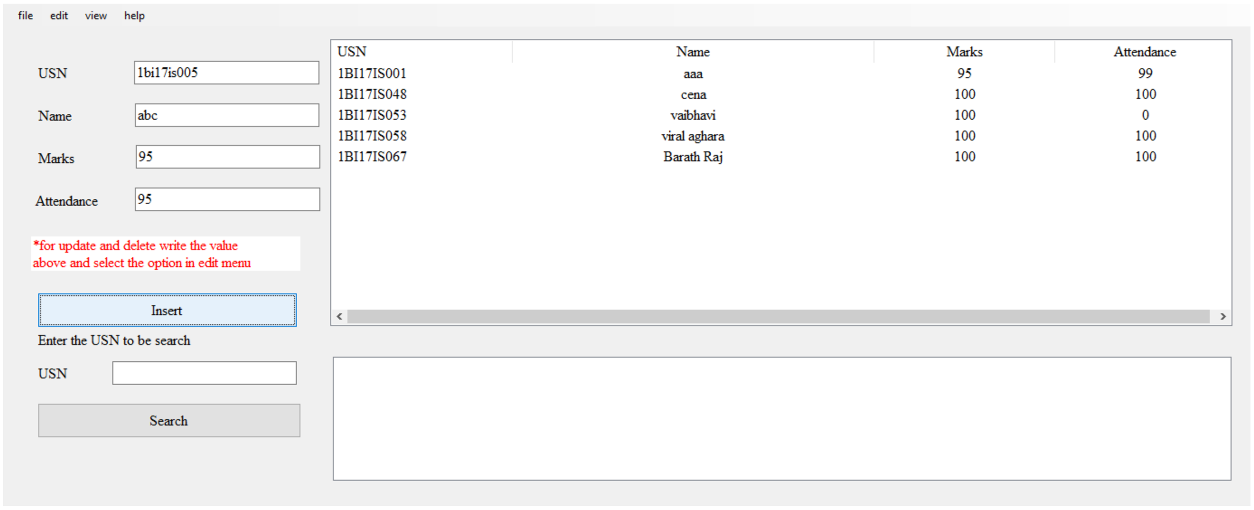
In this way the content can be seen by view->content display on clicking the record in file can be seen.



Name	Date modified	Type	Size
apache-jmeter-5.2.1	30-03-2020 10:31	File folder	
ATM-Transaction-System-master	21-04-2020 17:05	File folder	
BankAccountManagement	06-05-2020 17:00	File folder	
B-Plus-Tree-master	06-04-2020 10:56	File folder	
fs_project2-master	10-05-2020 17:37	File folder	
Morning	01-04-2020 00:07	File folder	
New folder	01-04-2020 00:09	File folder	
project	09-05-2020 14:15	File folder	
Turbo.C.3.2	17-04-2020 17:11	File folder	
abc.rft.rft	05-05-2020 19:13	RFT File	1 KB

Fig. 6.6: Save as dialog

This can be seen when file is not opened you go for save or when you go for save as directly. This will save your file in .rft format. The Exit in file tab exit button exits the software.



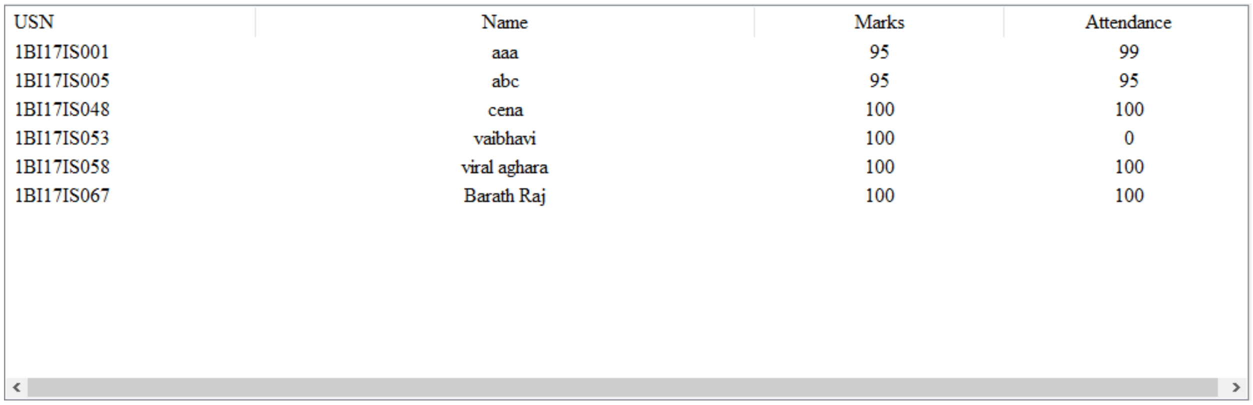
USN	1bi17is005
Name	abc
Marks	95
Attendance	95

*for update and delete write the value above and select the option in edit menu

USN	Name	Marks	Attendance
1BI17IS001	aaa	95	99
1BI17IS048	cena	100	100
1BI17IS053	vaibhavi	100	0
1BI17IS058	viral aghara	100	100
1BI17IS067	Barath Raj	100	100

Fig. 6.7: Insert Function

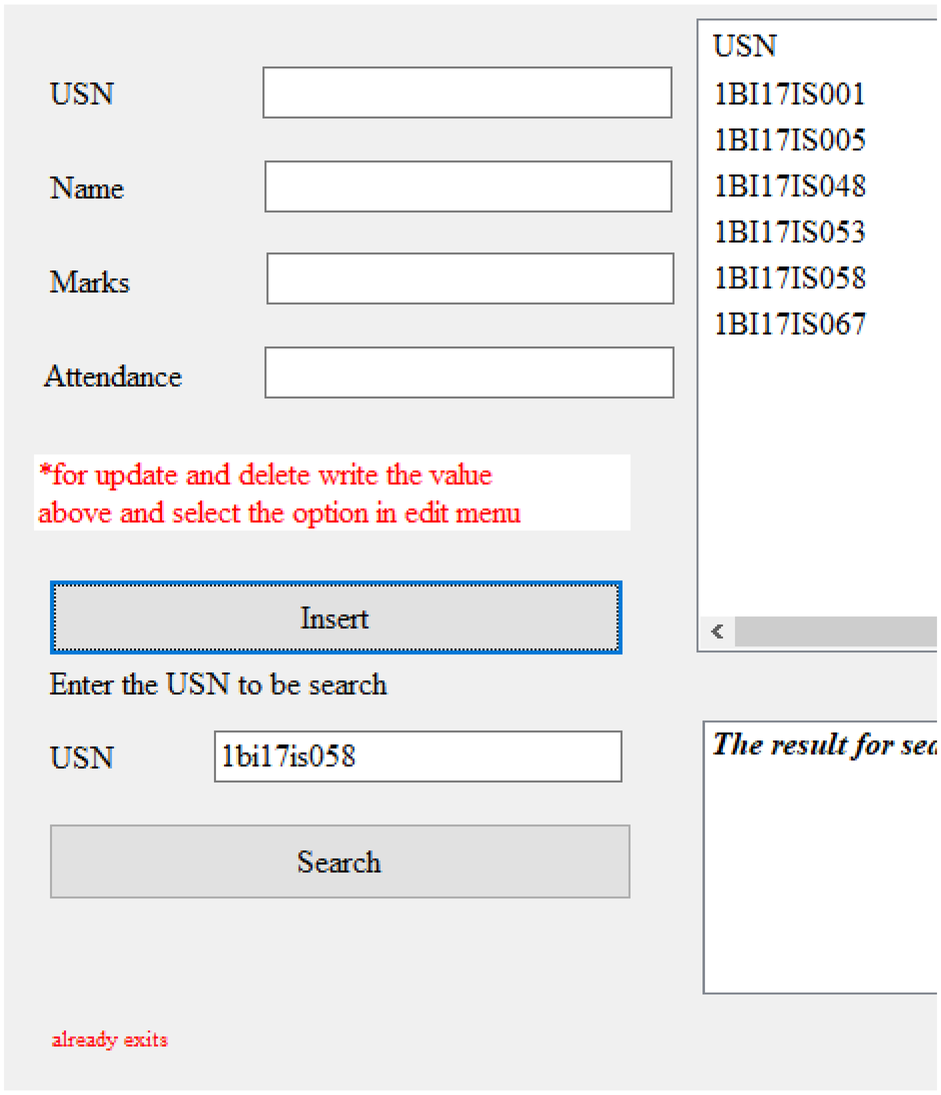
When we press the insert it read the value from textbox are converted in standard form and insert in the B + tree . The key used for splitting and sorting is USN. Once inserted can be seen using contain display button.



USN	Name	Marks	Attendance
1BI17IS001	aaa	95	99
1BI17IS005	abc	95	95
1BI17IS048	cena	100	100
1BI17IS053	vaibhavi	100	0
1BI17IS058	viral aghara	100	100
1BI17IS067	Barath Raj	100	100

Fig. 6.8: Display for insert

You can see when value is inserted it gets sorted and the tree gets balanced when a value is inserted.



*for update and delete write the value above and select the option in edit menu

1bi17is058

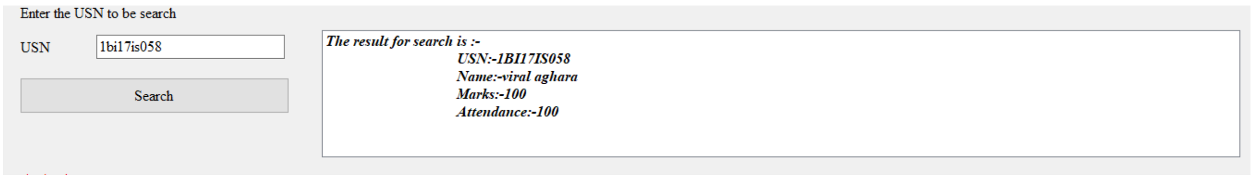
1BI17IS001
1BI17IS005
1BI17IS048
1BI17IS053
1BI17IS058
1BI17IS067

The result for sea

already exits

Fig. 6.9:Error of insert

When an exiting usn is inserted it display error already exiting.

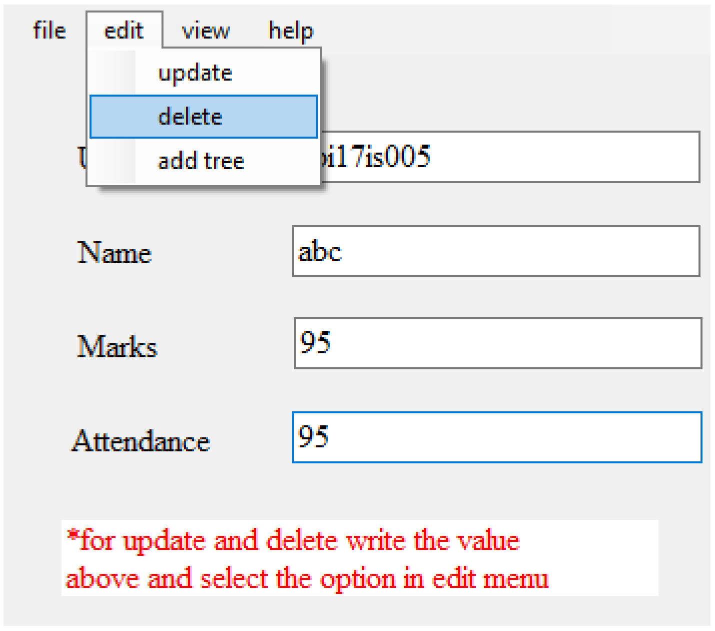


1bi17is058

The result for search is :-
USN:-1BI17IS058
Name:-viral aghara
Marks:-100
Attendance:-100

Fig. 6.10: Search Function

When a usn is searched it will display student detail in second display box.

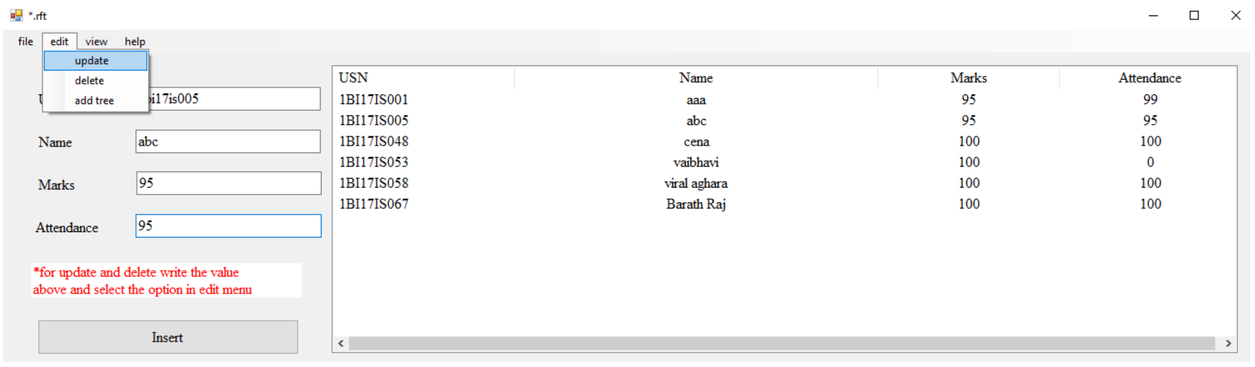


U	bi17is005
Name	abc
Marks	95
Attendance	95

*for update and delete write the value above and select the option in edit menu

Fig. 6.11:Delete Function

The delete function will read all the value from textboxs and finds the usn and deletes that record.



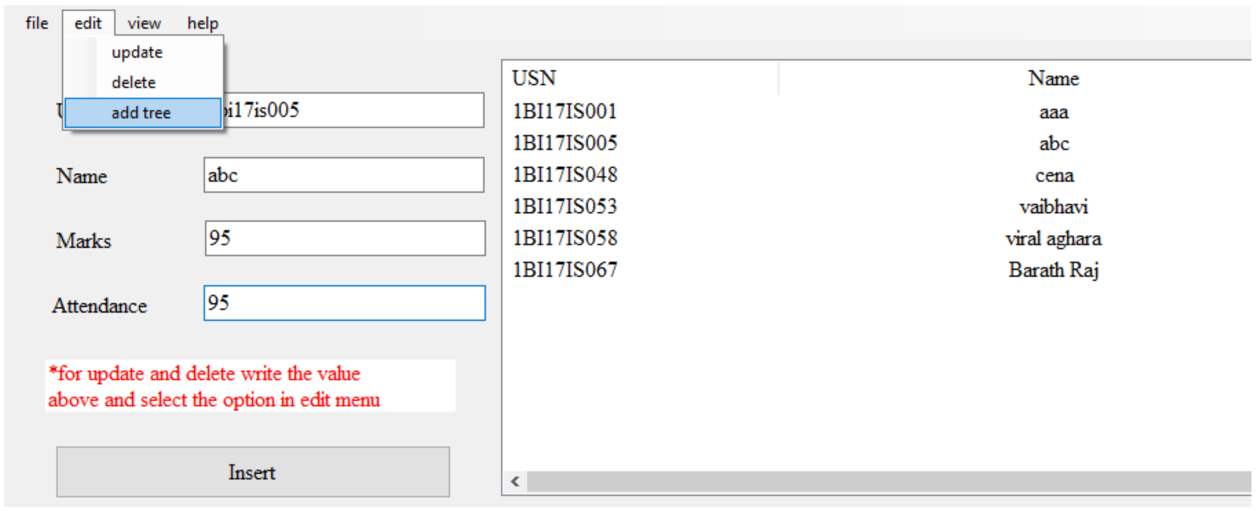
U	bi17is005
Name	abc
Marks	95
Attendance	95

*for update and delete write the value above and select the option in edit menu

USN	Name	Marks	Attendance
1BI17IS001	aaa	95	99
1BI17IS005	abc	95	95
1BI17IS048	cena	100	100
1BI17IS053	vaibhavi	100	0
1BI17IS058	viral aghara	100	100
1BI17IS067	Barath Raj	100	100

Fig. 6.12: Update Function

It works same as the delete fuction.



*for update and delete write the value above and select the option in edit menu

USN	Name
1BI17IS001	aaa
1BI17IS005	abc
1BI17IS048	cena
1BI17IS053	vaibhavi
1BI17IS058	viral aghara
1BI17IS067	Barath Raj

Fig. 6.13: Add tree function

The add tree function works same as the open but it file and add value form file in exits tree.

7. Source code

7.1 B+Tree Class

```
#include<iostream>
#include<string>
#include<fstream>
#include <vector>
#include <algorithm>
using namespace std;
int case_insensitive_match(string s1, string s2) {
	//convert s1 and s2 into lower case strings
	transform(s1.begin(), s1.end(), s1.begin(), ::toupper);
	transform(s2.begin(), s2.end(), s2.begin(), ::toupper);
	cout << s1 << "\t" << s2<<endl;
	if (s1.compare(s2) == 0)
		return 1; //The strings are same
	return 0; //not matched
}

vector<string> splitStrings(string str, char dl)
{
	string word = "";
	int num = 0;
	str = str + dl;
	int l = str.size();
	vector<string> substr_list;
	for (int i = 0; i < l; i++) {
		if (str[i] != dl)
			word = word + str[i];

		else {
			if ((int)word.size() != 0)
				substr_list.push_back(word);
			word = "";
		}
	}
	return substr_list;
}
class student
{
public:
	string usn;
	string name;
	string marks;
	string attendance;
	string Buf;
	char buf[100];
};
istream& operator >> (istream& in, student& s)
{
	cout << "Enter usn:-";
	in >> s.usn;
	cout << "Enter name:-";
	in >> s.name;
	cout << "Enter marks.:-";
	in >> s.marks;
	cout << "Enter attendance.:-";
	in >> s.attendance;
	return in;
}
ostream& operator << (ostream& out, student& s)
{
	out << s.usn << "\t" << s.name << "\t" << s.marks << "\t" << s.attendance << "\t";
	return out;
}
class node
{
public:
	student value[4];
	node* child[4];
	node* next, * per;
	node* parent;
	int size;
	node();
};
class btree
{
public:
	node* head;
	int flag, flage,ds;
	string st[1000];
	student sd[1000];
	void insert(student key);
	void search(student key);
	btree update(student key, student key2);
	void tree_view(node* n);
	btree del(student key);
	void write();
	void read();
	void display();
	btree();
private:
	node* split(node* n);
	node* tchilds(node* n);
	node* findlevel(student key, node* n);
};
node::node() {
	size = 4;
	for (int i = 0; i < size; i++) {
		value[i].usn = "";
		value[i].name = "";
		value[i].marks = "";
		value[i].attendance = "";
		child[i] = NULL;
	}
	size = 0;
	next = NULL;
	per = NULL;
	parent = NULL;
}
btree::btree() {
	head = NULL;
	flag = 0;
	flage = 0;
}
void btree::insert(student key) {
	ds = 0;

	transform(key.usn.begin(),key.usn.end(), key.usn.begin(), ::toupper);
	cout << key.usn << endl;
	if (head == NULL) {
		head = new node;
		head->value[head->size] = key;
		head->size++;
		return;
	}
	node* n = findlevel(key, head);
	int i;

	for (i = 0; i < n->size; i++) {
		if (case_insensitive_match(key.usn, n->value[i].usn)) {


				st[ds++]="already exits";
				return;
		}
```

```
                if (key.usn < n->value[i].usn) {
                        break;
                }
        }
        if (i == n->size) {
                n->value[i] = key;
                n->size++;
        }
        else {
                student temp;
                for (; i < n->size; i++) {
                        temp = n->value[i];
                        n->value[i] = key;
                        key = temp;
                }
                n->value[i] = key;
                n->size++;
        }
        if (n->size > 3) {
                node* x = split(n);
        }
        return;
}
node* btree::findlevel(student key, node* n) {
        node* ptr = n;
        int i;
        for (i = 0; i < ptr->size; i++) {
                if (key.usn < ptr->value[i].usn) {
                        if (ptr->child[i] != NULL) {
                                return(findlevel(key, ptr->child[i]));
                        }
                        else {
                                return ptr;
                        }
                }
        }
        if (i == ptr->size && key.usn > ptr->value[i].usn) {
                if (ptr->child[i] != NULL) {
                        return(findlevel(key, ptr->child[i]));
                }
                else
                {
                        return ptr;
                }
        }
        return ptr;
```

```
}
btree btree::del(student key) {
        transform(key.usn.begin(), key.usn.end(), key.usn.begin(), ::toupper);
        node* n = head;
        int x = 0;
        btree b;
        b.ds = 0;
        flage = 0;
        student a[1000];
        while (n->child[0] != NULL) {
                n = n->child[0];
        }
        while (n != NULL) {

                for (int i = 0; i < n->size; i++) {
                        if ((case_insensitive_match(key.usn, n->value[i].usn)) == 0) {
                                a[x++] = n->value[i];
                        }
                        else {
                                flage = 1;
                        }
                }
                n = n->next;
        }
        if (flage == 0) {
                b.st[0] = "element not found\n";
                b.ds++;
                b.head = head;
                return b;
        }
        for (int i = 0; i <= x; i++) {
                b.insert(a[i]);
                b.flage = 1;
        }
        return b;
}
btree btree::update(student key, student key2) {
        transform(key.usn.begin(), key.usn.end(), key.usn.begin(), ::toupper);
        transform(key2.usn.begin(), key2.usn.end(), key2.usn.begin(), ::toupper);
        node* n = head;
        int x = 0;
        btree b;
        b.ds = 0;
        flage = 0;
        student a[1000];
        while (n->child[0] != NULL) {
                n = n->child[0];

        }
        while (n != NULL) {

                for (int i = 0; i < n->size; i++) {
                        if ((case_insensitive_match(key.usn, n->value[i].usn))==0)
                                a[x++] = n->value[i];
                        else {
                                a[x++] = key2;
                                flage = 1;
                        }
                }
                n = n->next;
        }
        if (flage == 0) {
                b.st[0]= "element not found\n";
                b.ds++;
                b.head = head;
                return b;
        }
        for (int i = 0; i <= x; i++) {
                b.insert(a[i]);
                b.flage = 1;
        }
        n = b.head;
        while (n->child[0] != NULL) {
                n = n->child[0];
        }
        for (int i = 0; i < n->size; i++)
                cout << n->value[i];
        return b;
}
node* btree::split(node* n) {
        int m = (n->size / 2);
        int x = 0;
        node* ptr;
        if (n->parent == NULL) {
                head = new node;
                ptr = head;
                ptr->value[x] = n->value[m];
                ptr->size++;
        }
        else {
                ptr = n->parent;
                for (x = 0; x < ptr->size; x++) {
                        if (n->value[m].usn < ptr->value[x].usn) {
                                break;
                        }
                }
                student temp = n->value[m];
                student temp2;
                node* ad1, * ad2;
                ad1 = ptr->child[x];
                int y = x;
                for (; x < ptr->size; x++) {
                        temp2 = ptr->value[x];
                        ptr->value[x] = temp;
                        temp = temp2;

                        ad2 = ptr->child[x + 1];
                        ptr->child[x + 1] = ad1;
                        ad1 = ad2;
                }
                ptr->value[x] = temp;
                ptr->child[x + 1] = ad1;
                x = y;
                ptr->size++;
        }
        node* c1 = new node;
        node* c2 = new node;
        ptr->child[x] = c1;
        ptr->child[x + 1] = c2;
        c1->next = c2;
        c2->per = c1;
        if (x != 0) {
                if (ptr->child[x - 1] != NULL) {
                        ptr->child[x - 1]->next = c1;
                        c1->per = ptr->child[x - 1];
                }
        }

        if (ptr->child[x + 2] != NULL) {
                c2->next = ptr->child[x + 2];
                ptr->child[x + 2]->per = c2;
        }
        if (n->child[0] == NULL) {
                for (int i = 0; i < m; i++) {
                        c1->value[i] = n->value[i];
                        c1->size++;
                }
                for (int i = m, x = 0; i < n->size; i++, x++) {
```

```
                c2->value[x] = n->value[i];
                c2->size++;
            }
            if (n->next != NULL) {
                c2->next = n->next;
            }
            if (n->per != NULL)
                n->per->next = c1;
        }
        else {
            c1->child[0] = n->child[0];
            c1->child[0]->parent = c1;
            for (int i = 0; i < m; i++) {
                c1->value[i] = n->value[i];
                c1->child[i + 1] = n->child[i + 1];
                c1->child[i + 1]->parent = c1;
                c1->size++;
            }
            c2->child[0] = n->child[m + 1];
            c2->child[0]->parent = c2;
            for (int i = m + 1, x = 0; i < n->size; i++, x++) {
                c2->value[x] = n->value[i];
                c2->child[x + 1] = n->child[i + 1];
                c2->child[x + 1]->parent = c2;
                c2->size++;
            }

        }


        c1->parent = ptr;
        c2->parent = ptr;
        if (ptr->size > 3) {
            ptr = split(ptr);
        }

        return c2;
}
void btree::display() {
        node* n = head;
        ds = 0;
        while (n->child[0] != NULL) {
            n = n->child[0];

        }
        while (n != NULL) {
                for (int i = 0; i < n->size; i++) {
                        if (n->value[i].usn == "")
                                continue;
                        sd[ds++]=n->value[i];
                }
                n = n->next;
        }
        return;
}
void btree::search(student key) {
        transform(key.usn.begin(), key.usn.end(), key.usn.begin(), ::toupper);
        node* ptr = head;
        ds = 0;
        int x = 0;
        flag = 0;
        while (ptr != NULL) {

                if (ptr->child[0] == NULL) {
                        for (int i = 0; i < ptr->size; i++) {
                                if ((case_insensitive_match(key.usn, ptr-
>value[i].usn))==1) {
                                        transform(key.usn.begin(), key.usn.end(),
key.usn.begin(), ::toupper);
                                        cout << key.usn<<endl;
                                        flag = 1;
                                        sd[ds++] = ptr->value[i];
                                        return;
                                }
                        }
                        break;
                }
                else
                {
                        int i;
                        for (i = 0; i < ptr->size; i++) {
                                if (key.usn < ptr->value[i].usn) {
                                        break;
                                }
                        }
                        ptr = ptr->child[i];
                        cout << x++ << "\t";
                        cout << "->";
                }
```

```
	}

	st[0] = "usn not found";
	return;
}
void btree::tree_view(node* n) {
	cout << "|";
	for (int i = 0; i < n->size; i++) {
		cout << n->value[i];
	}
	cout << "|" << endl;
	while (n != NULL) {}


}
void btree::write() {
	node* n = head;
	ds = 0;
	for (int i = 0; i < 1000; i++)
	{
		st[i] = "";
	}
	while (n->child[0] != NULL) {
		n = n->child[0];

	}
	while (n != NULL) {

		for (int i = 0; i < n->size; i++) {
			if (n->value[i].usn == "")
				continue;
			st[ds++] = n->value[i].usn + "|" + n->value[i].name + "|" + n-
>value[i].marks + "|" + n->value[i].attendance + "|";
		}
		n = n->next;
	}
	return;
}
void btree::read() {
	char dl = '|';
	student s;
	cout << ds<<endl;
	for (int j = 0; j < ds; j++) {
		cout << st[j]<<j<<endl;
		vector<string> res = splitStrings(st[j], dl);
		s.usn = res[0];
```

```
                s.name = res[1];
                s.marks = res[2];
                s.attendance = res[3];
                int temp = ds;
                insert(s);
                ds = temp;
        }
}
```

7.2 Window/Interface Code

```
#pragma once

#include"header.h"

#include"update.h"

#include<string.h>

#include <msclr/marshal.h>

#include <msclr/marshal_cppstd.h>


namespace Project2 {


        using namespace System;

        using namespace System::ComponentModel;

        using namespace System::Collections;

        using namespace System::Windows::Forms;

        using namespace System::Data;

        using namespace System::Drawing;

        using namespace msclr::interop;

        using namespace std;

        using namespace System::IO;
```

```
/// <summary>
/// Summary for MyForm
/// </summary>
btree b;
student s,s2;
public ref class MyForm : public System::Windows::Forms::Form
{
public:
	int flags=1;
private: System::Windows::Forms::SaveFileDialog^ savefd;
private: System::Windows::Forms::Label^ label8;
private: System::Windows::Forms::ListBox^ listBox1;
private: System::Windows::Forms::ListView^ display;

private: System::Windows::Forms::ColumnHeader^ displayusn;
private: System::Windows::Forms::ColumnHeader^ displayname;
private: System::Windows::Forms::ColumnHeader^ displaymarks;
private: System::Windows::Forms::ColumnHeader^ dispalyattendance;




private: System::Windows::Forms::Label^ label7;
private: System::Windows::Forms::ListBox^ sdisplay;
```

```
private: System::Windows::Forms::OpenFileDialog^ openFileDialog1;








public:


public:
        String^ filename = "";
        MyForm(void)
        {
                InitializeComponent();
                //
                //TODO: Add the constructor code here
                //
        }

protected:
        /// <summary>
        /// Clean up any resources being used.
        /// </summary>
        ~MyForm()
        {
                if (components)
                {
                        delete components;
                }
        }
    private: System::Windows::Forms::TextBox^ usn;
    private: System::Windows::Forms::Button^ insert;
    protected:



    private: System::Windows::Forms::MenuStrip^ menuStrip1;
    private: System::Windows::Forms::ToolStripMenuItem^ fileToolStripMenuItem;
    private: System::Windows::Forms::ToolStripMenuItem^ newToolStripMenuItem;
    private: System::Windows::Forms::ToolStripMenuItem^ openToolStripMenuItem;
    private: System::Windows::Forms::ToolStripMenuItem^ saveToolStripMenuItem;
    private: System::Windows::Forms::ToolStripMenuItem^ saveAsToolStripMenuItem;
    private: System::Windows::Forms::ToolStripMenuItem^ exitToolStripMenuItem;
    private: System::Windows::Forms::ToolStripMenuItem^ editToolStripMenuItem;
    private: System::Windows::Forms::ToolStripMenuItem^ updateToolStripMenuItem;
    private: System::Windows::Forms::ToolStripMenuItem^ deleteToolStripMenuItem;
    private: System::Windows::Forms::ToolStripMenuItem^ addTreeToolStripMenuItem;
    private: System::Windows::Forms::ToolStripMenuItem^ viewToolStripMenuItem;
    private: System::Windows::Forms::ToolStripMenuItem^
contentDisplayToolStripMenuItem;
    private: System::Windows::Forms::ToolStripMenuItem^ heToolStripMenuItem;
    private: System::Windows::Forms::ToolStripMenuItem^ aboutToolStripMenuItem;
```

```
private: System::Windows::Forms::Label^ label1;



private: System::Windows::Forms::Label^ label2;

private: System::Windows::Forms::TextBox^ name;

private: System::Windows::Forms::TextBox^ marks;




private: System::Windows::Forms::Label^ label3;

private: System::Windows::Forms::Label^ label4;

private: System::Windows::Forms::TextBox^ attendance;


private: System::Windows::Forms::TextBox^ susn;



private: System::Windows::Forms::Label^ label5;

private: System::Windows::Forms::Label^ label6;


private: System::Windows::Forms::OpenFileDialog^ openFD;


private: System::Windows::Forms::Button^ button1;
```

```
	private:



	protected:


	private:
		/// <summary>
		/// Required designer variable.
		/// </summary>
		System::ComponentModel::Container ^components;

#pragma region Windows Form Designer generated code
		/// <summary>
		/// Required method for Designer support - do not modify
		/// the contents of this method with the code editor.
		/// </summary>
		void InitializeComponent(void)
		{
			this->usn = (gcnew System::Windows::Forms::TextBox());
			this->insert = (gcnew System::Windows::Forms::Button());
			this->menuStrip1 = (gcnew System::Windows::Forms::MenuStrip());
			this->fileToolStripMenuItem = (gcnew
System::Windows::Forms::ToolStripMenuItem());

			this->newToolStripMenuItem = (gcnew
System::Windows::Forms::ToolStripMenuItem());

			this->openToolStripMenuItem = (gcnew
System::Windows::Forms::ToolStripMenuItem());

			this->saveToolStripMenuItem = (gcnew
System::Windows::Forms::ToolStripMenuItem());

			this->saveAsToolStripMenuItem = (gcnew
System::Windows::Forms::ToolStripMenuItem());

			this->exitToolStripMenuItem = (gcnew
System::Windows::Forms::ToolStripMenuItem());

			this->editToolStripMenuItem = (gcnew
System::Windows::Forms::ToolStripMenuItem());

			this->updateToolStripMenuItem = (gcnew
System::Windows::Forms::ToolStripMenuItem());

			this->deleteToolStripMenuItem = (gcnew
System::Windows::Forms::ToolStripMenuItem());

			this->addTreeToolStripMenuItem = (gcnew
System::Windows::Forms::ToolStripMenuItem());

			this->viewToolStripMenuItem = (gcnew
System::Windows::Forms::ToolStripMenuItem());

			this->contentDisplayToolStripMenuItem = (gcnew
System::Windows::Forms::ToolStripMenuItem());

			this->heToolStripMenuItem = (gcnew
System::Windows::Forms::ToolStripMenuItem());

			this->aboutToolStripMenuItem = (gcnew
System::Windows::Forms::ToolStripMenuItem());

			this->label1 = (gcnew System::Windows::Forms::Label());

			this->label2 = (gcnew System::Windows::Forms::Label());
			this->name = (gcnew System::Windows::Forms::TextBox());

			this->marks = (gcnew System::Windows::Forms::TextBox());

			this->label3 = (gcnew System::Windows::Forms::Label());

			this->label4 = (gcnew System::Windows::Forms::Label());

			this->attendance = (gcnew System::Windows::Forms::TextBox());

			this->susn = (gcnew System::Windows::Forms::TextBox());

			this->label5 = (gcnew System::Windows::Forms::Label());

			this->label6 = (gcnew System::Windows::Forms::Label());

			this->openFD = (gcnew System::Windows::Forms::OpenFileDialog());

			this->button1 = (gcnew System::Windows::Forms::Button());

			this->savefd = (gcnew System::Windows::Forms::SaveFileDialog());

			this->label8 = (gcnew System::Windows::Forms::Label());

			this->listBox1 = (gcnew System::Windows::Forms::ListBox());

			this->display = (gcnew System::Windows::Forms::ListView());

			this->displayusn = (gcnew System::Windows::Forms::ColumnHeader());

			this->displayname = (gcnew
System::Windows::Forms::ColumnHeader());

			this->displaymarks = (gcnew
System::Windows::Forms::ColumnHeader());

			this->dispalyattendance = (gcnew
System::Windows::Forms::ColumnHeader());

			this->label7 = (gcnew System::Windows::Forms::Label());

			this->sdisplay = (gcnew System::Windows::Forms::ListBox());

			this->openFileDialog1 = (gcnew
System::Windows::Forms::OpenFileDialog());

			this->menuStrip1->SuspendLayout();

			this->SuspendLayout();
			//
			// usn
			//
			this->usn->Font = (gcnew System::Drawing::Font(L"Times New Roman",
12, System::Drawing::FontStyle::Regular, System::Drawing::GraphicsUnit::Point,
				static_cast<System::Byte>(0)));
			this->usn->Location = System::Drawing::Point(146, 63);
			this->usn->Margin = System::Windows::Forms::Padding(4, 4, 4, 4);
			this->usn->Name = L"usn";
			this->usn->Size = System::Drawing::Size(205, 26);
			this->usn->TabIndex = 0;
			//
			// insert
			//
			this->insert->Font = (gcnew System::Drawing::Font(L"Times New
Roman", 12, System::Drawing::FontStyle::Regular, System::Drawing::GraphicsUnit::Point,
				static_cast<System::Byte>(0)));
			this->insert->Location = System::Drawing::Point(39, 319);
			this->insert->Margin = System::Windows::Forms::Padding(4, 4, 4, 4);
			this->insert->Name = L"insert";
			this->insert->Size = System::Drawing::Size(288, 39);
			this->insert->TabIndex = 1;
			this->insert->Text = L"Insert";
			this->insert->UseVisualStyleBackColor = true;
			this->insert->Click += gcnew System::EventHandler(this,
&MyForm::button1_Click);
```

```
                    //
                    // menuStrip1
                    //
                    this->menuStrip1->Items->AddRange(gcnew cli::array<
System::Windows::Forms::ToolStripItem^  >(4) {
                              this->fileToolStripMenuItem,
                                        this->editToolStripMenuItem, this-
>viewToolStripMenuItem, this->heToolStripMenuItem
                    });
                    this->menuStrip1->Location = System::Drawing::Point(0, 0);
                    this->menuStrip1->Name = L"menuStrip1";
                    this->menuStrip1->Padding = System::Windows::Forms::Padding(9, 3, 0,
3);
                    this->menuStrip1->Size = System::Drawing::Size(1382, 25);
                    this->menuStrip1->TabIndex = 2;
                    this->menuStrip1->Text = L"menuStrip1";
                    //
                    // fileToolStripMenuItem
                    //
                    this->fileToolStripMenuItem->DropDownItems->AddRange(gcnew
cli::array< System::Windows::Forms::ToolStripItem^  >(5) {
                              this->newToolStripMenuItem,
                                        this->openToolStripMenuItem, this-
>saveToolStripMenuItem, this->saveAsToolStripMenuItem, this->exitToolStripMenuItem
                    });
                    this->fileToolStripMenuItem->Name = L"fileToolStripMenuItem";
                    this->fileToolStripMenuItem->Size = System::Drawing::Size(35, 19);
```

```
			this->fileToolStripMenuItem->Text = L"file";

			this->fileToolStripMenuItem->Click += gcnew
System::EventHandler(this, &MyForm::fileToolStripMenuItem_Click);

			//

			// newToolStripMenuItem

			//

			this->newToolStripMenuItem->Name = L"newToolStripMenuItem";

			this->newToolStripMenuItem->Size = System::Drawing::Size(111, 22);

			this->newToolStripMenuItem->Text = L"new";

			this->newToolStripMenuItem->Click += gcnew
System::EventHandler(this, &MyForm::newToolStripMenuItem_Click);

			//

			// openToolStripMenuItem

			//

			this->openToolStripMenuItem->Name = L"openToolStripMenuItem";

			this->openToolStripMenuItem->Size = System::Drawing::Size(111, 22);

			this->openToolStripMenuItem->Text = L"open";

			this->openToolStripMenuItem->Click += gcnew
System::EventHandler(this, &MyForm::openToolStripMenuItem_Click);

			//

			// saveToolStripMenuItem

			//

			this->saveToolStripMenuItem->Name = L"saveToolStripMenuItem";

			this->saveToolStripMenuItem->Size = System::Drawing::Size(111, 22);

			this->saveToolStripMenuItem->Text = L"save";

			this->saveToolStripMenuItem->Click += gcnew
System::EventHandler(this, &MyForm::saveToolStripMenuItem_Click);
```

```
			//
			// saveAsToolStripMenuItem
			//
			this->saveAsToolStripMenuItem->Name = 
L"saveAsToolStripMenuItem";
			this->saveAsToolStripMenuItem->Size = System::Drawing::Size(111, 
22);
			this->saveAsToolStripMenuItem->Text = L"save as";
			this->saveAsToolStripMenuItem->Click += gcnew 
System::EventHandler(this, &MyForm::saveAsToolStripMenuItem_Click);
			//
			// exitToolStripMenuItem
			//
			this->exitToolStripMenuItem->Name = L"exitToolStripMenuItem";
			this->exitToolStripMenuItem->Size = System::Drawing::Size(111, 22);
			this->exitToolStripMenuItem->Text = L"exit";
			this->exitToolStripMenuItem->Click += gcnew 
System::EventHandler(this, &MyForm::exitToolStripMenuItem_Click);
			//
			// editToolStripMenuItem
			//
			this->editToolStripMenuItem->DropDownItems->AddRange(gcnew 
cli::array< System::Windows::Forms::ToolStripItem^  >(3) {
				this->updateToolStripMenuItem,
					this->deleteToolStripMenuItem, this-
>addTreeToolStripMenuItem
			});
			this->editToolStripMenuItem->Name = L"editToolStripMenuItem";

			this->editToolStripMenuItem->Size = System::Drawing::Size(39, 19);

			this->editToolStripMenuItem->Text = L"edit";

			//

			// updateToolStripMenuItem

			//

			this->updateToolStripMenuItem->Name = L"updateToolStripMenuItem";

			this->updateToolStripMenuItem->Size = System::Drawing::Size(117, 22);

			this->updateToolStripMenuItem->Text = L"update ";

			this->updateToolStripMenuItem->Click += gcnew
System::EventHandler(this, &MyForm::updateToolStripMenuItem_Click);

			//

			// deleteToolStripMenuItem

			//

			this->deleteToolStripMenuItem->Name = L"deleteToolStripMenuItem";

			this->deleteToolStripMenuItem->Size = System::Drawing::Size(117, 22);

			this->deleteToolStripMenuItem->Text = L"delete";

			this->deleteToolStripMenuItem->Click += gcnew
System::EventHandler(this, &MyForm::deleteToolStripMenuItem_Click);

			//

			// addTreeToolStripMenuItem

			//

			this->addTreeToolStripMenuItem->Name =
L"addTreeToolStripMenuItem";

			this->addTreeToolStripMenuItem->Size = System::Drawing::Size(117,
22);

			this->addTreeToolStripMenuItem->Text = L"add tree";
			this->addTreeToolStripMenuItem->Click += gcnew
System::EventHandler(this, &MyForm::addTreeToolStripMenuItem_Click);

			//

			// viewToolStripMenuItem

			//

			this->viewToolStripMenuItem->DropDownItems->AddRange(gcnew
cli::array< System::Windows::Forms::ToolStripItem^  >(1) { this-
>contentDisplayToolStripMenuItem });

			this->viewToolStripMenuItem->Name = L"viewToolStripMenuItem";

			this->viewToolStripMenuItem->Size = System::Drawing::Size(43, 19);

			this->viewToolStripMenuItem->Text = L"view";

			//

			// contentDisplayToolStripMenuItem

			//

			this->contentDisplayToolStripMenuItem->Name =
L"contentDisplayToolStripMenuItem";

			this->contentDisplayToolStripMenuItem->Size =
System::Drawing::Size(155, 22);

			this->contentDisplayToolStripMenuItem->Text = L"content display";

			this->contentDisplayToolStripMenuItem->Click += gcnew
System::EventHandler(this, &MyForm::contentDisplayToolStripMenuItem_Click);

			//

			// heToolStripMenuItem

			//

			this->heToolStripMenuItem->DropDownItems->AddRange(gcnew
cli::array< System::Windows::Forms::ToolStripItem^  >(1) { this->aboutToolStripMenuItem });

			this->heToolStripMenuItem->Name = L"heToolStripMenuItem";

			this->heToolStripMenuItem->Size = System::Drawing::Size(42, 19);
			this->heToolStripMenuItem->Text = L"help";
			//
			// aboutToolStripMenuItem
			//
			this->aboutToolStripMenuItem->Name = L"aboutToolStripMenuItem";
			this->aboutToolStripMenuItem->Size = System::Drawing::Size(105, 22);
			this->aboutToolStripMenuItem->Text = L"about";
			this->aboutToolStripMenuItem->Click += gcnew
System::EventHandler(this, &MyForm::aboutToolStripMenuItem_Click);
			//
			// label1
			//
			this->label1->AutoSize = true;
			this->label1->Font = (gcnew System::Drawing::Font(L"Times New
Roman", 12, System::Drawing::FontStyle::Regular, System::Drawing::GraphicsUnit::Point,
				static_cast<System::Byte>(0)));
			this->label1->Location = System::Drawing::Point(36, 67);
			this->label1->Margin = System::Windows::Forms::Padding(4, 0, 4, 0);
			this->label1->Name = L"label1";
			this->label1->Size = System::Drawing::Size(41, 19);
			this->label1->TabIndex = 3;
			this->label1->Text = L"USN";
			//
			// label2
			//
			this->label2->AutoSize = true;
			this->label2->Font = (gcnew System::Drawing::Font(L"Times New 
Roman", 12, System::Drawing::FontStyle::Regular, System::Drawing::GraphicsUnit::Point, 
				static_cast<System::Byte>(0)));
			this->label2->Location = System::Drawing::Point(36, 114);
			this->label2->Margin = System::Windows::Forms::Padding(4, 0, 4, 0);
			this->label2->Name = L"label2";
			this->label2->Size = System::Drawing::Size(46, 19);
			this->label2->TabIndex = 5;
			this->label2->Text = L"Name";
			// 
			// name
			// 
			this->name->Font = (gcnew System::Drawing::Font(L"Times New 
Roman", 12, System::Drawing::FontStyle::Regular, System::Drawing::GraphicsUnit::Point, 
				static_cast<System::Byte>(0)));
			this->name->Location = System::Drawing::Point(147, 110);
			this->name->Margin = System::Windows::Forms::Padding(4, 4, 4, 4);
			this->name->Name = L"name";
			this->name->Size = System::Drawing::Size(204, 26);
			this->name->TabIndex = 6;
			// 
			// marks
			// 
			this->marks->Font = (gcnew System::Drawing::Font(L"Times New 
Roman", 12, System::Drawing::FontStyle::Regular, System::Drawing::GraphicsUnit::Point, 
				static_cast<System::Byte>(0)));
			this->marks->Location = System::Drawing::Point(148, 156);
			this->marks->Margin = System::Windows::Forms::Padding(4, 4, 4, 4);
			this->marks->Name = L"marks";
			this->marks->Size = System::Drawing::Size(204, 26);
			this->marks->TabIndex = 8;
			// 
			// label3
			// 
			this->label3->AutoSize = true;
			this->label3->Font = (gcnew System::Drawing::Font(L"Times New 
Roman", 12, System::Drawing::FontStyle::Regular, System::Drawing::GraphicsUnit::Point,
				static_cast<System::Byte>(0)));
			this->label3->Location = System::Drawing::Point(36, 161);
			this->label3->Margin = System::Windows::Forms::Padding(4, 0, 4, 0);
			this->label3->Name = L"label3";
			this->label3->Size = System::Drawing::Size(49, 19);
			this->label3->TabIndex = 9;
			this->label3->Text = L"Marks";
			// 
			// label4
			// 
			this->label4->AutoSize = true;
			this->label4->Font = (gcnew System::Drawing::Font(L"Times New 
Roman", 12, System::Drawing::FontStyle::Regular, System::Drawing::GraphicsUnit::Point,
				static_cast<System::Byte>(0)));
			this->label4->Location = System::Drawing::Point(33, 208);
			this->label4->Margin = System::Windows::Forms::Padding(4, 0, 4, 0);
			this->label4->Name = L"label4";
			this->label4->Size = System::Drawing::Size(78, 19);
			this->label4->TabIndex = 10;
			this->label4->Text = L"Attendance";
			// 
			// attendance
			// 
			this->attendance->Font = (gcnew System::Drawing::Font(L"Times New 
Roman", 12, System::Drawing::FontStyle::Regular, System::Drawing::GraphicsUnit::Point, 
				static_cast<System::Byte>(0)));
			this->attendance->Location = System::Drawing::Point(147, 203);
			this->attendance->Margin = System::Windows::Forms::Padding(4, 4, 4, 
4);
			this->attendance->Name = L"attendance";
			this->attendance->Size = System::Drawing::Size(205, 26);
			this->attendance->TabIndex = 11;
			// 
			// susn
			// 
			this->susn->Font = (gcnew System::Drawing::Font(L"Times New 
Roman", 12, System::Drawing::FontStyle::Regular, System::Drawing::GraphicsUnit::Point, 
				static_cast<System::Byte>(0)));
			this->susn->Location = System::Drawing::Point(122, 395);
			this->susn->Margin = System::Windows::Forms::Padding(4, 4, 4, 4);
			this->susn->Name = L"susn";
			this->susn->Size = System::Drawing::Size(204, 26);
			this->susn->TabIndex = 12;
			//
			// label5
			//
			this->label5->AutoSize = true;
			this->label5->Font = (gcnew System::Drawing::Font(L"Times New 
Roman", 12, System::Drawing::FontStyle::Regular, System::Drawing::GraphicsUnit::Point,
				static_cast<System::Byte>(0)));
			this->label5->Location = System::Drawing::Point(36, 362);
			this->label5->Margin = System::Windows::Forms::Padding(4, 0, 4, 0);
			this->label5->Name = L"label5";
			this->label5->Size = System::Drawing::Size(177, 19);
			this->label5->TabIndex = 13;
			this->label5->Text = L"Enter the USN to be search";
			//
			// label6
			//
			this->label6->AutoSize = true;
			this->label6->Font = (gcnew System::Drawing::Font(L"Times New 
Roman", 12, System::Drawing::FontStyle::Regular, System::Drawing::GraphicsUnit::Point,
				static_cast<System::Byte>(0)));
			this->label6->Location = System::Drawing::Point(36, 399);
			this->label6->Margin = System::Windows::Forms::Padding(4, 0, 4, 0);
			this->label6->Name = L"label6";
			this->label6->Size = System::Drawing::Size(41, 19);
			this->label6->TabIndex = 14;
			this->label6->Text = L"USN";
			// 
			// openFD
			// 
			this->openFD->FileName = L"openFileDialog";
			// 
			// button1
			// 
			this->button1->Font = (gcnew System::Drawing::Font(L"Times New
Roman", 12, System::Drawing::FontStyle::Regular, System::Drawing::GraphicsUnit::Point,
				static_cast<System::Byte>(0)));
			this->button1->Location = System::Drawing::Point(39, 441);
			this->button1->Margin = System::Windows::Forms::Padding(4, 4, 4, 4);
			this->button1->Name = L"button1";
			this->button1->Size = System::Drawing::Size(292, 39);
			this->button1->TabIndex = 17;
			this->button1->Text = L"Search";
			this->button1->UseVisualStyleBackColor = true;
			this->button1->Click += gcnew System::EventHandler(this,
&MyForm::search);
			// 
			// label8
			// 
			this->label8->AutoSize = true;
			this->label8->Location = System::Drawing::Point(34, 270);
			this->label8->Margin = System::Windows::Forms::Padding(4, 0, 4, 0);
			this->label8->Name = L"label8";
			this->label8->Size = System::Drawing::Size(0, 19);
			this->label8->TabIndex = 18;
			// 
			// listBox1
			// 
			this->listBox1->BackColor = System::Drawing::Color::White;
			this->listBox1->BorderStyle = 
System::Windows::Forms::BorderStyle::None;
			this->listBox1->ForeColor = System::Drawing::Color::Red;
			this->listBox1->FormattingEnabled = true;
			this->listBox1->ItemHeight = 19;
			this->listBox1->Items->AddRange(gcnew cli::array< System::Object^ 
>(2) { L"*for update and delete write the value ", L"above and select the option in edit menu" });
			this->listBox1->Location = System::Drawing::Point(32, 257);
			this->listBox1->Margin = System::Windows::Forms::Padding(4, 4, 4, 4);
			this->listBox1->Name = L"listBox1";
			this->listBox1->Size = System::Drawing::Size(298, 38);
			this->listBox1->TabIndex = 19;
			// 
			// display
			// 
			this->display->Columns->AddRange(gcnew cli::array< 
System::Windows::Forms::ColumnHeader^  >(4) {
				this->displayusn, this->displayname,
                        this->displaymarks, this->dispalyattendance
            });
            this->display->Font = (gcnew System::Drawing::Font(L"Times New 
Roman", 12, System::Drawing::FontStyle::Regular, System::Drawing::GraphicsUnit::Point,
                    static_cast<System::Byte>(0)));
            this->display->HideSelection = false;
            this->display->Location = System::Drawing::Point(363, 39);
            this->display->Margin = System::Windows::Forms::Padding(4, 4, 4, 4);
            this->display->Name = L"display";
            this->display->Size = System::Drawing::Size(998, 317);
            this->display->TabIndex = 20;
            this->display->UseCompatibleStateImageBehavior = false;
            this->display->View = System::Windows::Forms::View::Details;
            //
            // displayusn
            //
            this->displayusn->Text = L"USN";
            this->displayusn->Width = 200;
            //
            // displayname
            //
            this->displayname->Text = L"Name";
            this->displayname->TextAlign = 
System::Windows::Forms::HorizontalAlignment::Center;
            this->displayname->Width = 400;
            //
```

```
			// displaymarks
			//
			this->displaymarks->Text = L"Marks";
			this->displaymarks->TextAlign = 
System::Windows::Forms::HorizontalAlignment::Center;
			this->displaymarks->Width = 200;
			//
			// dispalyattendance
			//
			this->dispalyattendance->Text = L"Attendance";
			this->dispalyattendance->TextAlign = 
System::Windows::Forms::HorizontalAlignment::Center;
			this->dispalyattendance->Width = 200;
			//
			// label7
			//
			this->label7->AutoSize = true;
			this->label7->Font = (gcnew System::Drawing::Font(L"Times New 
Roman", 8.25F, System::Drawing::FontStyle::Regular, System::Drawing::GraphicsUnit::Point,
				static_cast<System::Byte>(0)));
			this->label7->ForeColor = System::Drawing::Color::Red;
			this->label7->Location = System::Drawing::Point(38, 542);
			this->label7->Margin = System::Windows::Forms::Padding(4, 0, 4, 0);
			this->label7->Name = L"label7";
			this->label7->Size = System::Drawing::Size(0, 14);
			this->label7->TabIndex = 23;
			//
			// sdisplay
			//
			this->sdisplay->Font = (gcnew System::Drawing::Font(L"Times New
Roman", 12, static_cast<System::Drawing::FontStyle>((System::Drawing::FontStyle::Bold |
System::Drawing::FontStyle::Italic)),
				System::Drawing::GraphicsUnit::Point,
static_cast<System::Byte>(0)));
			this->sdisplay->FormattingEnabled = true;
			this->sdisplay->ItemHeight = 19;
			this->sdisplay->Location = System::Drawing::Point(366, 390);
			this->sdisplay->Margin = System::Windows::Forms::Padding(4, 4, 4, 4);
			this->sdisplay->Name = L"sdisplay";
			this->sdisplay->Size = System::Drawing::Size(994, 137);
			this->sdisplay->TabIndex = 24;
			this->sdisplay->SelectedIndexChanged += gcnew
System::EventHandler(this, &MyForm::sdisplay_SelectedIndexChanged);
			//
			// openFileDialog1
			//
			this->openFileDialog1->FileName = L"openFileDialog1";
			//
			// MyForm
			//
			this->AutoScaleDimensions = System::Drawing::SizeF(9, 19);
			this->AutoScaleMode =
System::Windows::Forms::AutoScaleMode::Font;
```

```
			this->ClientSize = System::Drawing::Size(1382, 588);
			this->Controls->Add(this->sdisplay);
			this->Controls->Add(this->label7);
			this->Controls->Add(this->display);
			this->Controls->Add(this->listBox1);
			this->Controls->Add(this->label8);
			this->Controls->Add(this->button1);
			this->Controls->Add(this->label6);
			this->Controls->Add(this->label5);
			this->Controls->Add(this->susn);
			this->Controls->Add(this->attendance);
			this->Controls->Add(this->label4);
			this->Controls->Add(this->label3);
			this->Controls->Add(this->marks);
			this->Controls->Add(this->name);
			this->Controls->Add(this->label2);
			this->Controls->Add(this->label1);
			this->Controls->Add(this->insert);
			this->Controls->Add(this->usn);
			this->Controls->Add(this->menuStrip1);
			this->Font = (gcnew System::Drawing::Font(L"Times New Roman", 12, 
System::Drawing::FontStyle::Regular, System::Drawing::GraphicsUnit::Point,
				static_cast<System::Byte>(0)));
			this->MainMenuStrip = this->menuStrip1;
			this->Margin = System::Windows::Forms::Padding(4, 4, 4, 4);
```

```
                        this->MaximumSize = System::Drawing::Size(1398, 627);

                        this->MinimumSize = System::Drawing::Size(1398, 627);

                        this->Name = L"MyForm";

                        this->Text = L"Student db";

                        this->FormClosing += gcnew
System::Windows::Forms::FormClosingEventHandler(this, &MyForm::MyForm_FormClosing);

                        this->menuStrip1->ResumeLayout(false);

                        this->menuStrip1->PerformLayout();

                        this->ResumeLayout(false);

                        this->PerformLayout();


                }

#pragma endregion

        private: System::Void button1_Click(System::Object^ sender, System::EventArgs^ e) {


                if (usn->Text==""|| name->Text == "" || marks->Text == "" || attendance->Text
== "")

                {

                        MessageBox::Show("Enter Value Please.", "Error");

                }

                else

                {

                        msclr::interop::marshal_context con;

                        s.usn= con.marshal_as< std::string >(usn->Text);

                        s.name= con.marshal_as<std::string>(name->Text);

                        s.marks= con.marshal_as<std::string>(marks->Text);
                        s.attendance= con.marshal_as<std::string>(attendance->Text);

                        b.insert(s);

                        if (b.ds != 0) {

                                label7->Text = gcnew String(b.st[0].c_str());

                                usn->Text = ""; name->Text = ""; marks->Text = ""; attendance-
>Text = "";

                                return;

                        }

                        flags = 0;

                        usn->Text = ""; name->Text = ""; marks->Text =""; attendance->Text =
"";

                }

        }

        private: System::Void fileToolStripMenuItem_Click(System::Object^ sender,
System::EventArgs^ e) {

        }

private: System::Void exitToolStripMenuItem_Click(System::Object^ sender,
System::EventArgs^ e) {


        this->Close();

}





private: System::Void openToolStripMenuItem_Click(System::Object^ sender,
System::EventArgs^ e) {

        openFD->Filter = "rft files (*.rft)|*.rft";
```

```
openFD->FileName = "";
openFD->ShowDialog();
if (openFD->FileName == "")
        return;
filename = openFD->FileName;
this->Text = filename;
msclr::interop::marshal_context con;
string s= con.marshal_as<std::string>(filename);
cout << s << endl;
b = btree();
if (b.head == NULL) {
        cout << "new";
}
for (int i = 0; i < 1000; i++) {
        b.st[i] = "";
}
b.ds = 0;
StreamReader^ r = File::OpenText(filename);
int x = 0;
String^ line;
while ((line = r->ReadLine()) != nullptr) {
        b.st[x++] = con.marshal_as<std::string>(line);
}
cout << x << endl;
b.ds = x;
```

```
        b.read();

        r->Close();

}

private: System::Void contentDisplayToolStripMenuItem_Click(System::Object^ sender,
System::EventArgs^ e) {

        if (b.head == NULL)

        {

                MessageBox::Show("NO Value Inserted", "Error");

                return;

        }

        display->Items->Clear();

        for (int i = 0; i < 1000; i++) {

                b.st[i] = "";

        }

        b.ds = 0;

        b.display();


        for (int i = 0; i < b.ds; i++) {

                String^ s = gcnew String((b.sd[i].usn).c_str());

                ListViewItem^ dis=gcnew ListViewItem(s);

                dis->SubItems->Add(gcnew String((b.sd[i].name).c_str()));

                dis->SubItems->Add(gcnew String((b.sd[i].marks).c_str()));

                dis->SubItems->Add(gcnew String((b.sd[i].attendance).c_str()));

                display->Items->Add(dis);
        }
        label7->Text = "";
}

private: System::Void search(System::Object^ sender, System::EventArgs^ e) {
        sdisplay->Items->Clear();
        label7->Text = "";
        for (int i = 0; i < 1000; i++) {
                b.st[i] = "";
        }
        b.ds = 0;
        if (susn->Text == "")
        {
                MessageBox::Show("Enter Value Please.", "Error");
        }
        else
        {
                msclr::interop::marshal_context con;
                s.usn = con.marshal_as<std::string>(susn->Text);
                cout << s.usn << endl;
                s.name = "";
                s.marks = "";
                s.attendance = "";
                b.search(s);
                if(b.flag==0) {
                    label7->Text = gcnew String(b.st[0].c_str());

                    return;

            }

            for (int i = 0; i < b.ds; i++) {

                String^ s = "The result for search is :-";

                sdisplay->Items->Add(s);

                s="\t\tUSN:-"+gcnew String((b.sd[i].usn).c_str());

                sdisplay->Items->Add(s);

                s = "\t\tName:-" + gcnew String((b.sd[i].name).c_str());

                sdisplay->Items->Add(s);

                s = "\t\tMarks:-" + gcnew String((b.sd[i].marks).c_str());

                sdisplay->Items->Add(s);

                s = "\t\tAttendance:-" + gcnew String((b.sd[i].attendance).c_str());

                sdisplay->Items->Add(s);


            }

            b.ds = 0;

            susn->Text = "";

    }

}

    private: System::Void newToolStripMenuItem_Click(System::Object^ sender,
System::EventArgs^ e) {

            b = btree();

            s = student();

            filename = "";
				flags = 0;

		}

private: System::Void saveToolStripMenuItem_Click(System::Object^ sender,
System::EventArgs^ e) {

		if (flags != 1) {

				if (filename == "") {

						savefd->FileName = "";

						savefd->ShowDialog();

						if (savefd->FileName == "")

								return;

						filename = savefd->FileName;

						this->Text = filename;

						StreamWriter^ outp = File::CreateText(filename);

						b.write();

						for (int i = 0; i < b.ds; i++) {

								String^ stud = gcnew String(b.st[i].c_str());

								cout << b.st[i];

								outp->WriteLine(stud);

						}

						flags = 1;

						outp->Close();

				}

				else {

						StreamWriter^ out = File::CreateText(filename);

						b.write();
```

```
                    for (int i = 0; i < b.ds; i++) {
                        String^ stud = gcnew String(b.st[i].c_str());
                        cout << b.st[i];
                        out->WriteLine(stud);
                    }
                    out->Close();
                    flags = 1;
                }
        }
}
private: System::Void saveAsToolStripMenuItem_Click(System::Object^ sender,
System::EventArgs^ e) {
        savefd->FileName = "";
        savefd->ShowDialog();
        if (savefd->FileName == "")
            return;
        filename = savefd->FileName;
        this->Text = filename;
        StreamWriter^ out = File::CreateText(filename);
        b.write();
        for (int i = 0; i < b.ds; i++) {
            String^ stud = gcnew String(b.st[i].c_str());
            out->WriteLine(stud);
        }
        out->Close();
```

```
}

private: System::Void MyForm_FormClosing(System::Object^ sender,
System::Windows::Forms::FormClosingEventArgs^ e) {

        if (flags != 1) {

                System::Windows::Forms::DialogResult r;

                r = MessageBox::Show("Do you really want to close the program without
saving?", "project2", MessageBoxButtons::YesNoCancel);

                if (r == System::Windows::Forms::DialogResult::Yes) {


                }

                else if (r == System::Windows::Forms::DialogResult::No) {

                        if (filename == "") {

                                savefd->FileName = "";

                                savefd->ShowDialog();

                                if (savefd->FileName == "")

                                        return;

                                filename = savefd->FileName;

                                this->Text = filename;

                                StreamWriter^ outp = File::CreateText(filename);

                                b.write();

                                for (int i = 0; i < b.ds; i++) {

                                        String^ stud = gcnew String(b.st[i].c_str());

                                        cout << b.st[i];

                                        outp->WriteLine(stud);

                                }

                                outp->Close();
```

```
                    flags = 1;
                }
                else {
                    StreamWriter^ out = File::CreateText(filename);
                    b.write();
                    for (int i = 0; i < b.ds; i++) {
                        String^ stud = gcnew String(b.st[i].c_str());
                        cout << b.st[i];
                        out->WriteLine(stud);
                    }
                    out->Close();
                    flags = 1;
                }
            }
            else {
                e->Cancel = true;
            }
    }


}
private: System::Void addTreeToolStripMenuItem_Click(System::Object^ sender,
System::EventArgs^ e) {
    openFD->Filter = "rft files (*.rft)|*.rft";
    openFD->FileName = "";
    openFD->ShowDialog();
```

```
        if (openFD->FileName == "")

                return;

        String^ filename1 = openFD->FileName;

        msclr::interop::marshal_context con;

        string s = con.marshal_as<std::string>(filename1);

        cout << s << endl;

        for (int i = 0; i < 1000; i++) {

                b.st[i] = "";

        }

        StreamReader^ r = File::OpenText(filename1);

        int x = 0;

        String^ line;

        while ((line = r->ReadLine()) != nullptr) {

                b.st[x++] = con.marshal_as<std::string>(line);

        }

        b.ds = x;

        b.read();

        r->Close();

}

private: System::Void aboutToolStripMenuItem_Click(System::Object^ sender, 
System::EventArgs^ e) {

        System::Windows::Forms::DialogResult r;

        r = MessageBox::Show("Made by viral @copyrigth", "project2", 
MessageBoxButtons::OK);


}
```

```
private: System::Void updateToolStripMenuItem_Click(System::Object^ sender,
System::EventArgs^ e) {

        if (usn->Text == "" || name->Text == "" || marks->Text == "" || attendance->Text == "")

        {

                MessageBox::Show("Enter Value Please.", "Error");

        }

        else

        {

                msclr::interop::marshal_context con;

                s.usn = con.marshal_as< std::string >(usn->Text);

                s.name = con.marshal_as<std::string>(name->Text);

                s.marks = con.marshal_as<std::string>(marks->Text);

                s.attendance = con.marshal_as<std::string>(attendance->Text);

                usn->Text = ""; name->Text = ""; marks->Text = ""; attendance->Text = "";

                Project2::MyForm1 f;

                f.ShowDialog();

                StreamReader^ r = File::OpenText("project.txt");

                s2.usn = con.marshal_as< std::string >(r->ReadLine());

                b = b.update(s2, s);

                if (b.ds != 0) {

                        label7->Text = gcnew String(b.st[0].c_str());

                        return;

                }

                r->Close();

                flags = 0;
```

```
		}
	}
	private: System::Void deleteToolStripMenuItem_Click(System::Object^ sender,
	System::EventArgs^ e) {
		if (usn->Text == "" || name->Text == "" || marks->Text == "" || attendance->Text == "")
		{
			MessageBox::Show("Enter Value Please.", "Error");
		}
		else
		{
			msclr::interop::marshal_context con;
			s.usn = con.marshal_as< std::string >(usn->Text);
			s.name = con.marshal_as<std::string>(name->Text);
			s.marks = con.marshal_as<std::string>(marks->Text);
			s.attendance = con.marshal_as<std::string>(attendance->Text);
			b=(b.del(s));
			cout << b.ds << endl << b.st[0] << endl;
			if (b.ds != 0) {
				label7->Text = gcnew String(b.st[0].c_str());
				return;
			}
			flags = 0;
			usn->Text = ""; name->Text = ""; marks->Text = ""; attendance->Text = "";
		}
	}
```

```
private: System::Void sdisplay_SelectedIndexChanged(System::Object^ sender,
System::EventArgs^ e) {

}

};

}
```