KL University, Guntur
FED : Department of BES-I
I Year / II Semester :AY 2021-2022

Data Structures -21SC1202

(Projects can be implemented either in C)

Project-1: Title: Comparative study on sorting algorithms

Description: The main aim of this project is to perform a comparative study on various sorting techniques on the basis of time complexity and space complexity. There are three modules in this project

- ➢ **Implementation of sorting techniques**
- ➢ **Comparison based on time complexity**
- ➢ **Comparison based on space complexity**

Requirements: To implement this project, students should have knowledge on

- Sorting algorithms
- Asymptotic notations
- C programming skills

Project-2: Title: Employee Record System

Description: The main features of this project include basic file handling operations; you will learn how to add, list, modify and delete data to/from file. The source code is relatively short, so thoroughly go through the mini project, and try to analyze how things such as functions, pointers, files, and arrays are implemented.

Currently, listed below are the only features that make up this project, but you can add new features as you like to make this project a better one!

Add record
List record
Modify record
Delete record

Requirements: To implement this project, students should have knowledge on

- Sorting algorithms
- Asymptotic notations
- C programming skills

Project-3: Title: Implementation of stack Applications

Description: The main aim of this project is to implement the various applications of stack data structure in C programming language. There are three modules in this project

- ➢ **Conversion of infix expression to post fix expression**: user enters infix expression as input, it converts given infix expression to postfix expression
- ➢ **Evaluation of postfix expressions**: it takes the postfix expression generated in above module and evaluates that postfix expression
- ➢ **Balancing of symbols**: user enters an expression with all kinds of symbols, it validates whether all the brackets in given expression are properly used or not

Requirements: To implement this project student should have knowledge on

- Working of stack data structure
- Pointers, strings, functions and structures in C Programming Language
- Operator precedence and associativity rules

Project-4: Title: Implementation of Linked List Applications

Description: The main aim of this project is to implement one of the most important applications of linked list such as polynomial operations such as addition, subtraction, multiplication and derivation. To perform these operations each polynomial needs to represent in one linked list and each node in the list contains three parts to store coefficient, exponent and link to next term of polynomial respectively. There are four modules in in this project

- **polynomial Addition**
- **polynomial subtraction**
- **polynomial multiplication**
- **polynomial derivation**

Requirements: To implement this project student should have knowledge on

- creating using linked lists
- pointers, self-referential structures
- polynomial operations

Project-5 : Title: Hash based Inventory System

Description: The main aim of this project is to implement a hashing algorithm to create a list of inventory parts and their quantities sold. There are three modules in this project

- **Construction of hash table:** HASH tables are widely used to quickly search and retrieve information from enormous amounts of data. In this for spare part code its code is taken and generates hash code and spare part record to search retrieve.
- **Search for an inventory item:** In this the user has enter spare part code, it generates respective hash code to access respective spare part record and prints that record indicates its quantity sold
- **Reports:** In this module it has to generate a complete report of spare parts and their quantity sold.

Requirements: To implement this project student should have knowledge on

- Indexing
- Hash tables
- Hashing functions

Project-6: Title: Bill Notification System

Description: The main aim of this project is to implement bill notification system, which alerts the user to pay the bill based on its due date. There are three modules in this project

- Creating priority queue of bills
- Managing priority of bills based on due date
- User alerts

Requirement: To implement this project, students should have knowledge on

- Priority queues
- Input and output statements
- Structures, pointers

Project –7 : Title: Stock Exchange Information Base

Description: Companies and people often buy and sells stocks. Often they buy the same stock for different prices at different times. Say a person owns 1000 shares a certain stock (such as Checkpoint), she may have bought the stock in amounts of 100 shares over 10 different times with 10 different prices.

In this assignment, you will be using a queue for storing data for FIFO accounting You should use an array based implementation for your queue based implementation or a linked list for implementing your queue.

Your queue should have records with the following fields: The name of the stock (a string or int), the number of shares of a stock (an int), the purchase price (can be a decimal).

You can assume that the first element of the structure is the security bought first, the second was bought second, etc. The user should be able to enter information about various stocks, the amount of shares, and the price. The user can then enter a query about a certain stock and the cost according to the FIFO accounting methods for a certain number of shares.

The following could be your menu:

Press 1 to enter a new stock Press 2 to find the LIFO and FIFO price for a stock. If 1 is pressed, the user needs to enter the stock symbol, and the number of shares, and the price. If 2 is pressed, the user needs to enter the stock symbol being queried and the number of shares in question.

Modules: 1. Menu driven Function
2. Creation of Stock Information
3. Query based on input

Project -8 : Title: Banking system

Description:A bank needs to maintain records of its customers. It is decided to create a file using BST-Tree or any other data structure which you think is useful. The order is based on the key and the Social Security number of each Customer. Each record contains the following information:

Name,
Social Security Number (SSN)
Address: Street City State Pincode (Can use a Nested Structure for this)
Date of Birth
Marital Status
Account Number
Account Type (Fixed, Saving, etc.)

A File needs to be designed to provide menu driven facility to its users.

Modules: The facilities are:

I. Insert the record for a new customer
2. Find and display the record for a customer specified by name or by Social Security Number(SSN)
3. Update the record
4. Delete the record of a customer from the file

Use SSN for BST Project.

Project – 9 :Title: Sparse Matrix Implementation

Description: Implement a sparse matrix in which any or most of the entries are zero. Because allocating memory space for all entries of the matrix will be wasteful we intend to allocate memory space only for nonzero entries.

Modules:

(a) Represent a sparse matrix as a doubly linked circular or any other data structure which you think is useful.

(b) Write a program to perform the following operations: (i) Read in inputs for the entries of a sparse matrix and form a suitable data structure. (ii) Addition of two sparse matrices (iii) Subtraction of two sparse matrices (iv) Multiplication of two sparse matrices (v) Print sparse matrix (in matrix form).
Hint: Each entry of a sparse matrix can be viewed as a structure of the form:
Row-index,Column-index,Value Left pointer to pointer.
Row index points to the next row (i.e. down). Column-index points to the next column (i.e. right). Value points to the information of data type added. Left pointer points to the element towards the next left element. Right pointer points to the element towards the next up element.

Project – 10 :Title: Student Information System

Description: This can be used as a file of student‟s information for a department. The program should be able to dynamically allocate or deallocate storage for the student‟s records using linked lists. The file should have the following fields: the first and last names, a course code, and a grade for a student.
Modules:

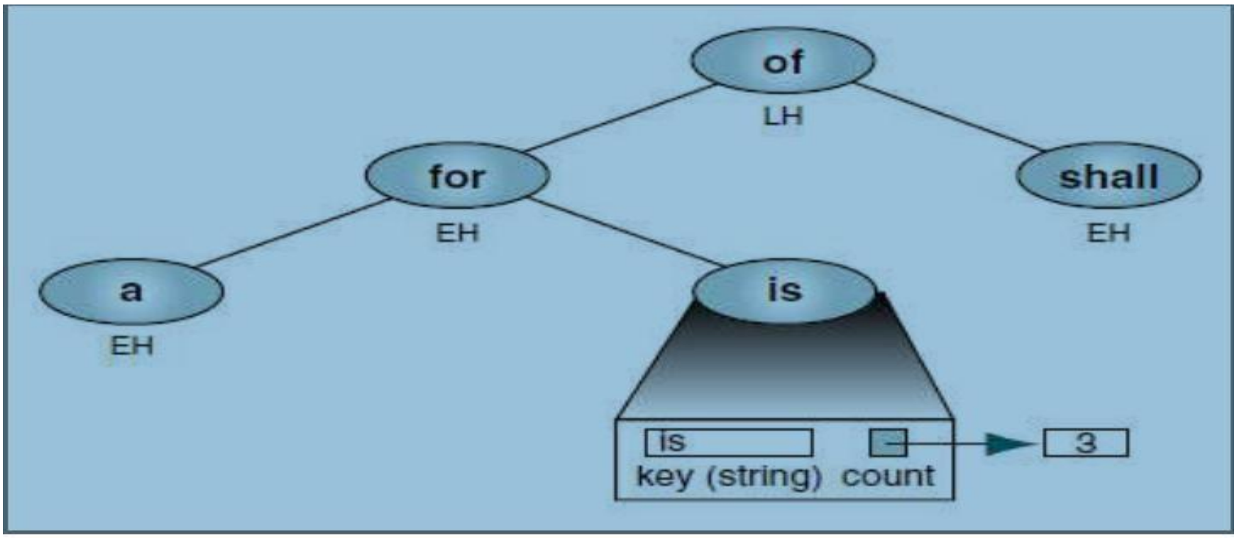
1. Insertion of student record
2. Searching for student record
3. Updating of student record
4. Deletion of student record

Project – 11 :Title: Mini-Telephone Directory

Description: Implementa Mini-Telephone Directory using a hash table with separate chaining.

Project – 12 : AVL Tree

Create an AVL tree application that uses a tree structure containing all of the words in a document, with a count of the number of times each word is used. Each entry in the AVL tree



contains a word from the document and a pointer to an integer that contains a count of the number of times the word appears in the document.
Module: 1

1. Program: **counts the words in a file**.
2. Function: Reads file and creates AVL tree containing list of all words used in the file with count of the number of times each word is found in the file.
3. Function: Reads one word from file.
4. Function: compares two integers identified by pointers to integers.
5. Function: Prints the list with the count for each word.
6. Function: Prints one word from the list with its count.

Project – 13 :Title: Hospital Management

Description: Consider a file of patient‟s information for a hospital. The program should be able to allocate and deallocate storage memory for the patient‟s records. The file should have the following information field: the first and last names, patient id, address, related disease, date of admission. Devise an appropriate C structures and circular queue using arrays to implement the following functions:

a) creation of circular queue, b) accessing the element from the circular queue, and c) searching element from the circular queue.

Project – 14 :Title: Word Tree

Description: Parsing a file is when you read a file to collect information from the file. In this assignment, you will parse a file, and put all of the words in a BST. You will use the BST to collect data about the number of times a word was found in the file. You should make no assumptions about which letters are in the middle (like M). The first word you encounter will be the root. If the next word is greater, put it to the right. If it is less, put it to the left. It is possible that the tree you make will be very sparse (think what happens when the first word is zylberstein). Assume all words in the file are lower case (you can convert them easily anyway). I would recommend using the string library (it makes comparisons much better).

Devise appropriate functions for a) creating a BST, b) adding any word, c) deleting any word, d) modification of any word, and e) searching any word in a BST.

Project – 15 :Title: Binary Search Tree and its operationsDescription: Implement BST and all its operations

1. Creation
2. Insertion of a node
3. Deletion of a node
4. Preorder
5. Inorder
6. Postorder traversals.
7. Search

Project – 16 :Title: AVL Tree and its operations

Description: Implement AVL and all its operations (all rotations).

Project – 17 :Title: Dictionary

Description: Creating dictionary using linked list.

Modules:

1) adding words
2)Searching words
3)Display dictionary
4)Deleting

Project – 18 :Title: Library Book Circulation System

Description: The library circulation system will keep track of every book as well as library cardholders. Each time a book is checked out or returned, the system must keep trackof it. Books can be added to the library"s collection and also removed. Due dates forbooks should be tracked, as well as notices sent out for materials that are more than aweek overdue. Fines for overdue materials should be calculated, and a record kept of theamount owed by each cardholder.Design appropriate classes that keep records of book(book no, book name, authorname), cardholders (member no, member name, age, address, city) andissue_return(book no, member no, date of issue, date of return, fine).

The modules in this project are

- keeping records of books
- keeping records of videos and
- keeping records of audios

Project – 19 :Title: Movie Ticket Booking

Description: The main purpose of online ticket booking system is to provide another way for the customer to buy cinema ticket.It is an automatic system, where we will automate the reservation of tickets and enquiries about availability of tickets. After inserting the data to file, staff need not to worry about the orders received through the system and hence reduces the manual work. One of the best features of the system is to refund the amount on cancellation of tickets by customer.

The modules in this project are

- To provide an anytime anyplace service for the customer
- To provide refund
- To minimize the number of staff at the ticket box
- To promote the film on the internet
- To increase the profit

To obtain statistic information from the booking record

Project – 20 :Title: TrainTicket

Description: Forjourneyof longer distances though we have airways most of the people use the railways, which is most convenient, affordable means of transport in India. So keeping this in view, the reservation of railways is a most important task and it must be faster and efficient as the demand (travellers) is very high. In order to meet this demand, manual reservation is completely ruled out and it requires an efficient program to implement the online reservation.

This program enables us to choose the train even there is no necessary to fill a form at the railway reservation counter, i.e. we can directly select from the choices provided for us with train numbers and their origin, departure time, destination & arrival time at that station and the class to travel in. If there is any concession, we can also avail it and then program gives us the final output as train ticket with the amount to be paid. It is completely developed in C language without using graphics. But through VDU basics we achieved the colors in it.

This simplifies the risks and makes things faster in the mode of railways!!!!

Project- 21 :Title: Implementation of undo redo operations

Description: The main aim of this project is to implement redo and undo operations using double ended queue. The modules in this project are

- Enqueuer the previous operation into queue
- Dequeuer the previous operation to redo
- Applying undo and redo

Requirements: To implement this project student should have knowledge on

- Redo undo operations
- Functionality of double ended queue

Project – 22 :Title: Palindrome Detector

A palindrome is a phrase that reads the same forwardsas it does backwards. For example, “a man, a plan, a canal, Panama,” is a palindrome. Writea program that uses a stack to check for palindromes in each line of a text file. Try yourprogram on the example text file,
Your program should output the palindromes that it finds in the document. For example:
"a man, a plan, a canal, Panama" is a palindrome.
"Don"t nod" is a palindrome.
"Taco Cat!" is a palindrome.

Project – 23 :Title: Phonebook

Phonebook is a very simple mini project in C that can help you understand the basic concepts of functions, file handling and data structure. This application will teach you how to add, list, modify or edit, search and delete data to/from the file.
Adding new records, listing them, modifying them and updating, search for contacts saved, and deleting the phonebook records are the basic functions which make up the main menu of this Phonebook application
Personal information such as name, sex, father’s name, phone number, citizenship number, email and address are asked while adding a record into the Phonebook. These records can then be modified, listed, searched for and removed.

Project – 24 :Title: Employee Management

Description: Create an employee Management system using Linked List. The data should be kept in a file.

Do the following operations.

1. Creation
2. Insertion

3. Deletion
4. Search
5. Update
6. Sort b
7. Display the data
8. Merge two separate lists i.e Merge 2 departments data

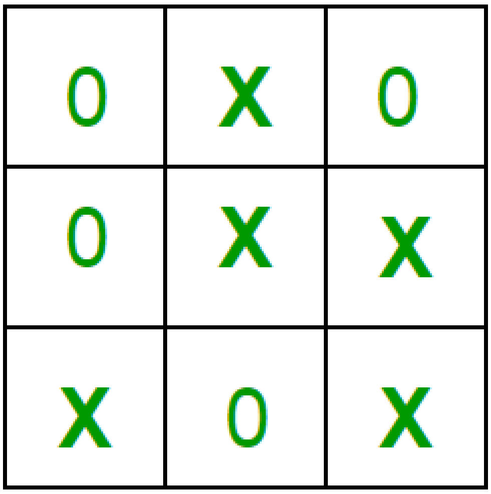
Project –25 :Title: Expression Trees using BST

Description: Implement the expression trees using BST.

1. Creation
2. Derive Infix expression.
3. Derive Prefix expression.
4. Derive Postfix expression.

Project –26 :Tic-Tac-Toe Game

- The game is to be played between two people (in this program between HUMAN and COMPUTER).
- One of the player chooses „O‟ and the other „X‟ to mark their respective cells.
- The game starts with one of the players and the game ends when one of the players has one whole row/ column/ diagonal filled with his/her respective character („O‟ or „X‟).
- If no one wins, then the game is said to be draw.



0	X	0
0	X	X
X	0	X