Innovative Pedagogical Activities

Course: Data Structures **Course Code: BTCOC303**

Pedagogy refers to a student centered **teaching** and learning (SCL) approach where educators are reflective in their theory, practice and policy implementation in **teaching**/learning, resulting to positive impacts in the learners.

Having a well-thought-out **pedagogy** can improve the quality of your **teaching** and the way students learn, helping them gain a deeper grasp of fundamental material. Being mindful of the way we **teach** can help us better understand how to help students achieve deeper **learning**.

Keeping in mind the importance of pedagogical approach we designed a pedagogy activity for the students. Pedagogy activity was posted on whats app group & On Gnomio Moodle Site and sufficient time was given to the students to solve the activity.

Following are the day wise details of pedagogy activities conducted during the refresher program:

Pedagogy Activities Details:

Sr. No	Name of the Activity	Unit	WhatsApp/ Online/Gnomio	No of Students Successfully Completed
1.	Millionaire Game	1	Gnomio	62
2.	Snake & Ladder Game	4	Gnomio	70
5.	Project Based Learning	All units	Gnomio	62

Innovative Tools: Gnomio Moodle as a LMS Tools, Quizziz.com, Google Form, Jam board, Epic Pen, animated Videos, PPT's, Google Meet

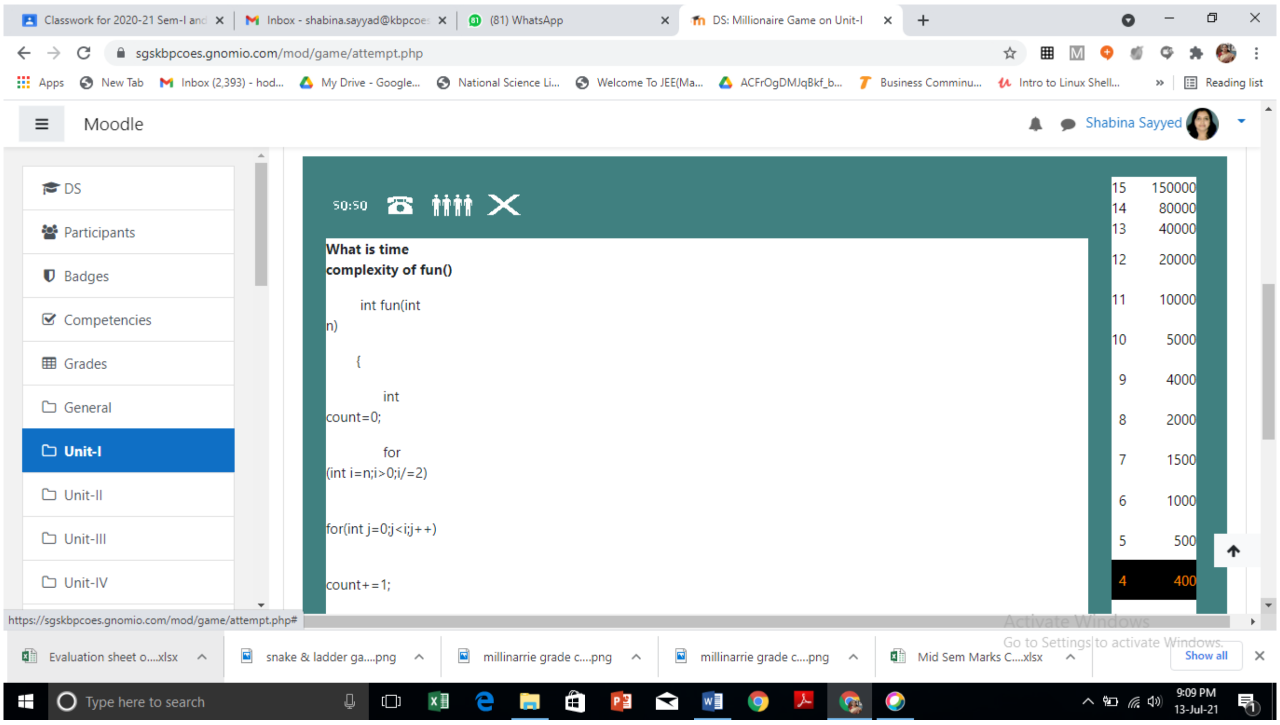
Activity No: 01

Name of the Activity: Millionaire Game on Unit-I

Millionaire Game — This is Kaun Bangega Crorepati (KBC) Game on Unit-I of Data Structures Course.

There are 15 attempts. There is important instruction that in any attempt if you fail to give the right answer then you will be eliminated from the game and then you have to restart from the beginning.

. **Screenshot of Kaun Bangega Crorepati (KBC) Game**

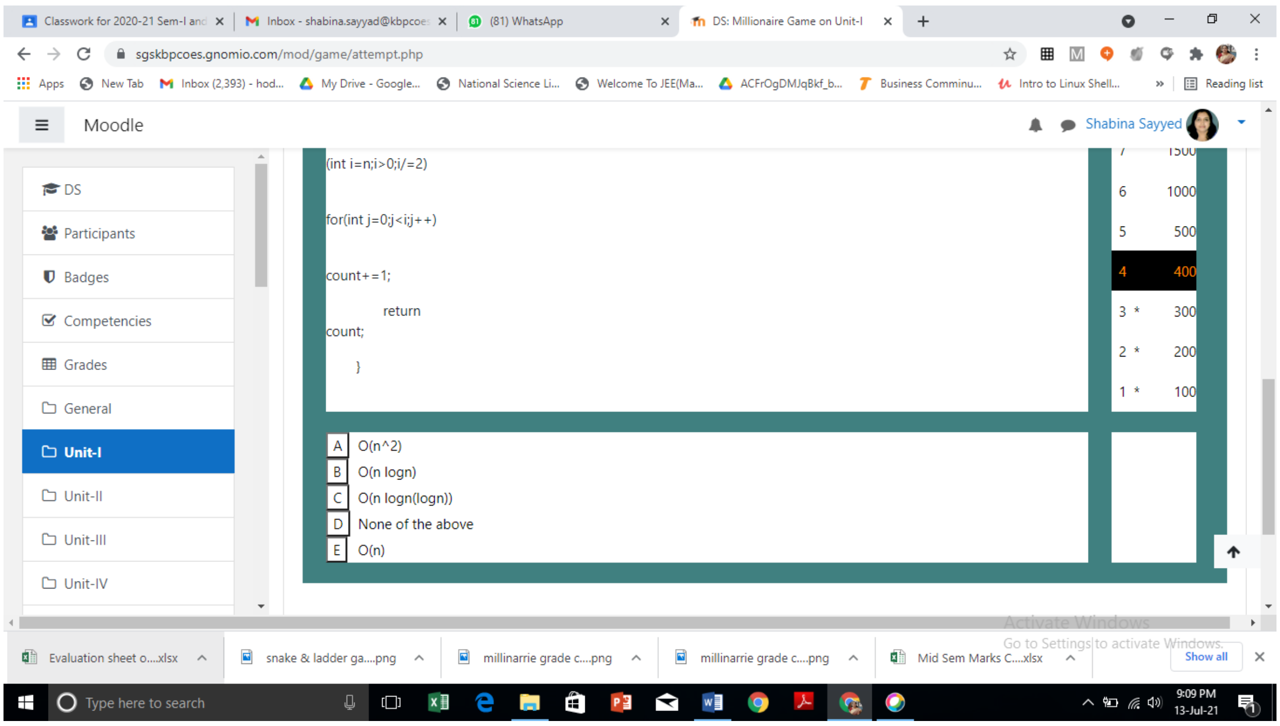


Classwork for 2020-21 Sem-I and
Inbox - shabina.sayyad@kbpcoe
(81) WhatsApp
DS: Millionaire Game on Unit-I
sgskbpcoes.gnomio.com/mod/game/attempt.php
Moodle
Shabina Sayyed
DS
Participants
Badges
Competencies
Grades
General
Unit-I
Unit-II
Unit-III
Unit-IV
50:50

What is time complexity of fun()

```
int fun(int n)
{
int count=0;
for (int i=n;i>0;i/=2)
for(int j=0;j<i;j++)
count+=1;
```

15	150000
14	80000
13	40000
12	20000
11	10000
10	5000
9	4000
8	2000
7	1500
6	1000
5	500
4	400



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DS
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Grades
General
Unit-I
Unit-II
Unit-III
Unit-IV

```
(int i=n;i>0;i/=2)
for(int j=0;j<i;j++)
count+=1;
return count;
}
```

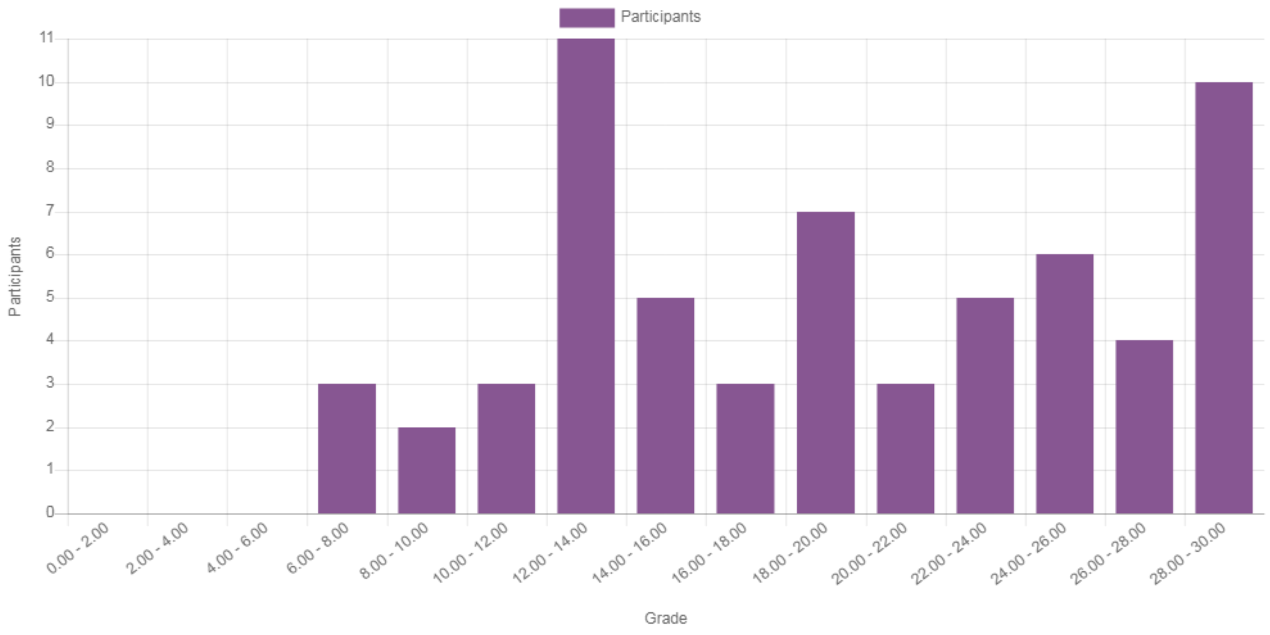
6	1000
5	500
4	400
3 *	300
2 *	200
1 *	100

A O(n^2)
B O(n logn)
C O(n logn(logn))
D None of the above
E O(n)

Students Responses:

Grade Table : 62 Responses from students

Course name	Data Structures
Number of complete graded first attempts	62
Total number of complete graded attempts	62
Average grade of first attempts	63.51%
Average grade of all attempts	63.51%
Average grade of last attempts	63.51%



Grade Chart of Students Responses- KBC Millionaire Game

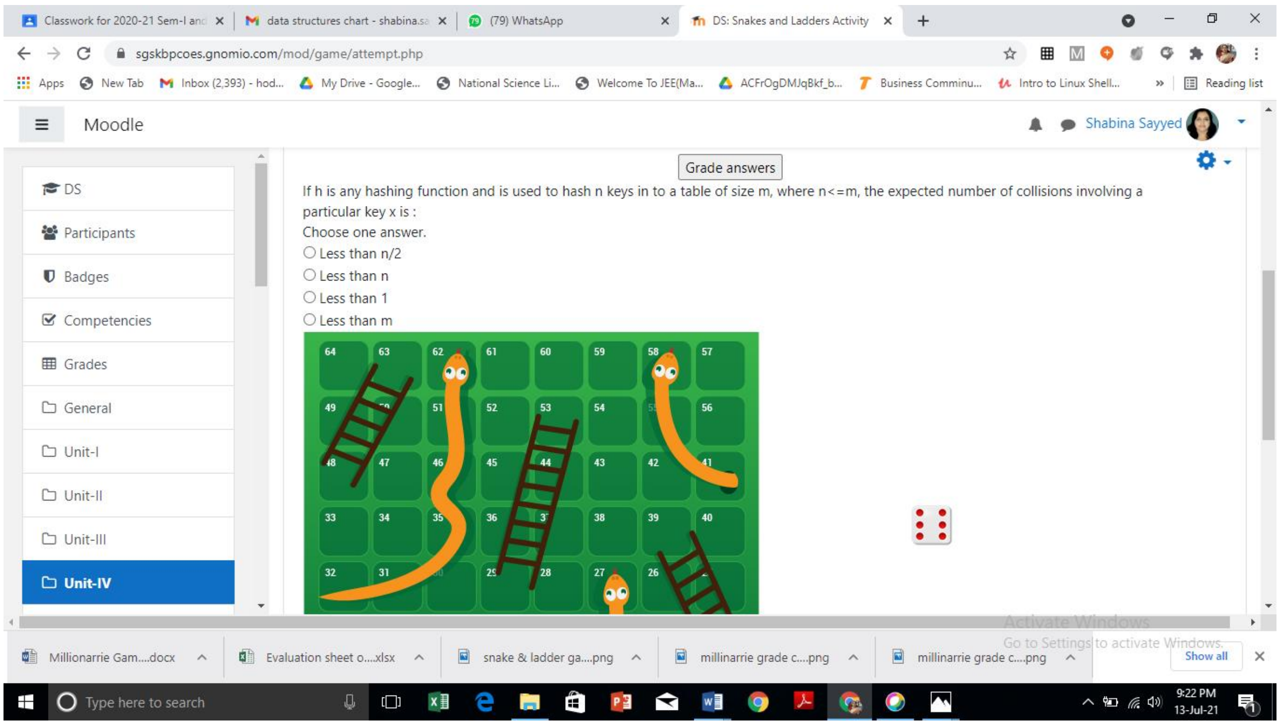
Activity No: 02

Name of the Activity: Snake & Ladder Game on Unit-IV

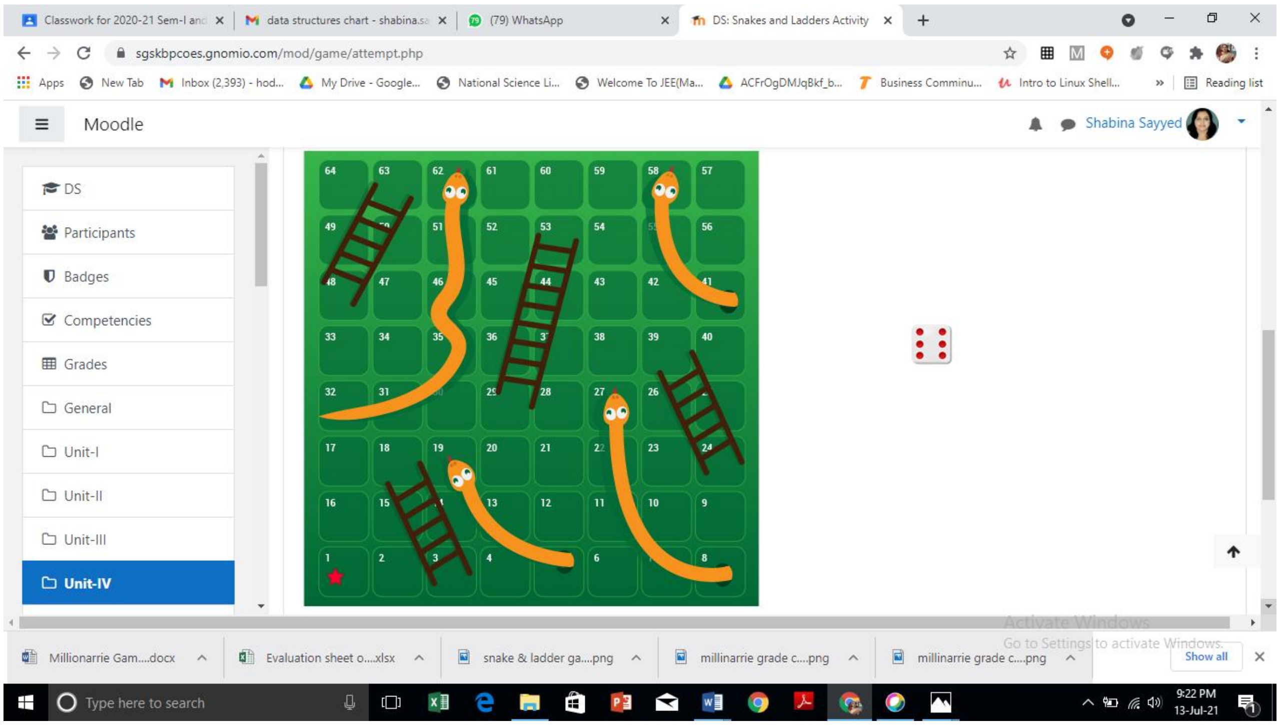
Snake & Ladder Game — This is Snake & Ladder Game on Unit-IV of Data Structures Course.

There are only one attempt. There is important instruction that in any attempt if you fail to give the right answer then you will be eliminated from the game and then you have to restart from the beginning.

Screenshot of Snake & Ladder Game



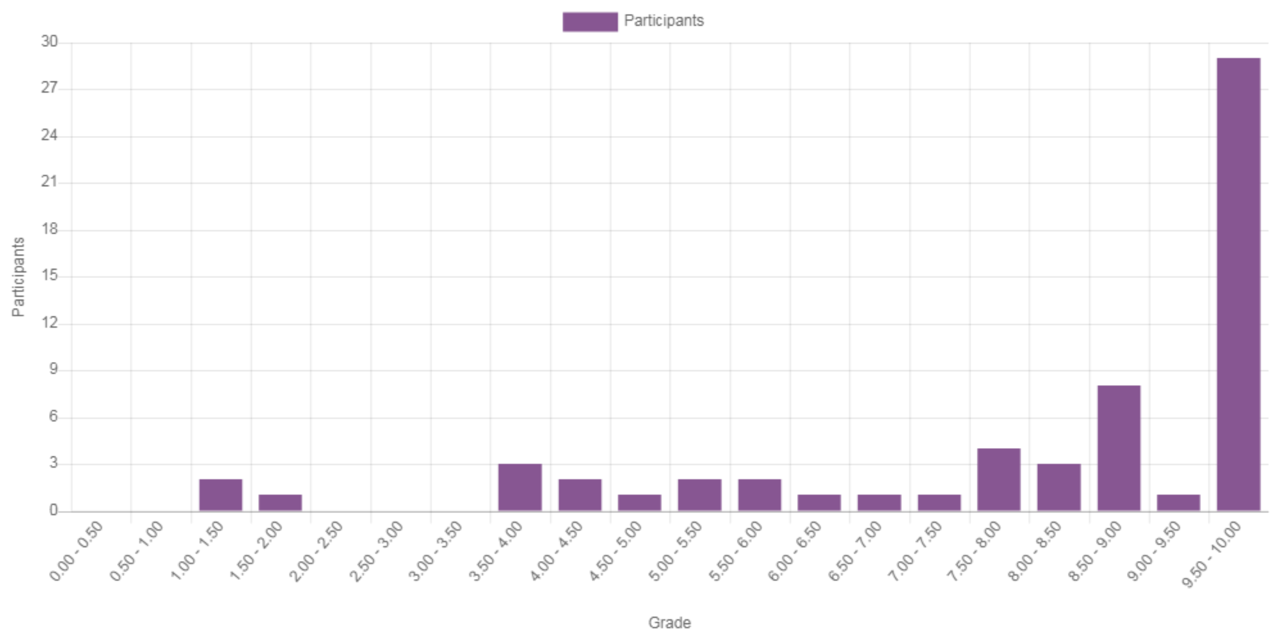
If h is any hashing function and is used to hash n keys in to a table of size m, where n<=m, the expected number of collisions involving a particular key x is :
Choose one answer.
- Less than n/2
- Less than n
- Less than 1
- Less than m



Students Responses:

Grade Table : 70 Responses from students

Quiz name	Quiz on Unit-II on 20th Aug
Course name	Data Structures
Number of complete graded first attempts	61
Total number of complete graded attempts	70
Average grade of first attempts	74.56%
Average grade of all attempts	77.70%
Average grade of last attempts	81.00%
Average grade of highest graded attempts	81.00%



Grade Chart of Students Responses –Snake & Ladder Game

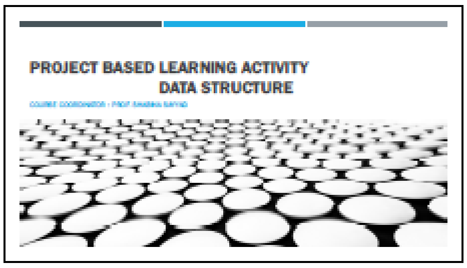
Activity No: 03

Name of the Activity: Project Based Learning

Project-based learning is a student-centered pedagogy that involves a dynamic classroom approach in which it is believed that students acquire a deeper knowledge through active exploration of real-world challenges and problems.

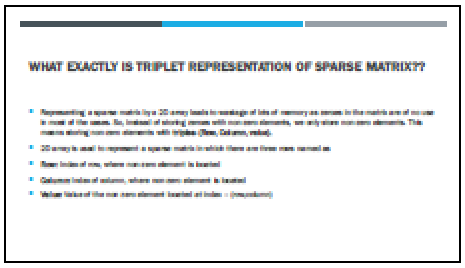
Sample Responses of Project Based Learning Activity- PowerPoint Presentation

13-Jul-21



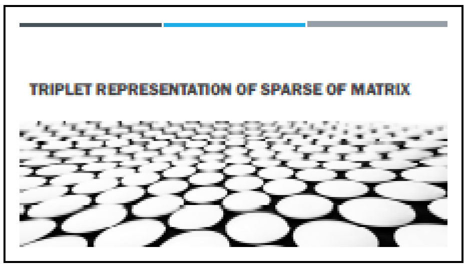
PROJECT BASED LEARNING ACTIVITY
DATA STRUCTURE

COURSE COORDINATOR - PROF. [illegible]

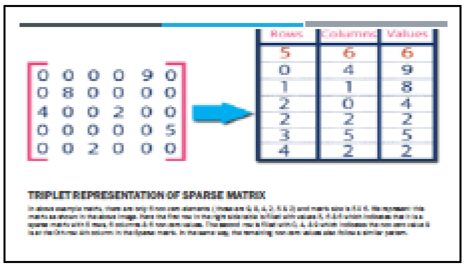


WHAT EXACTLY IS TRIPLET REPRESENTATION OF SPARSE MATRIX??

- Representing a sparse matrix by a 2D array leads to wastage of lots of memory as zeroes in the matrix are of no use in most of the cases. So, instead of storing zeroes with non-zero elements, we only store non-zero elements. This means storing non-zero elements with triples (Row, Column, value).
- 2D array is used to represent a sparse matrix in which there are three rows named as
- Row: Index of row, where non-zero element is located
- Column: Index of column, where non-zero element is located
- Value: Value of the non zero element located at index – (row,column)



TRIPLET REPRESENTATION OF SPARSE OF MATRIX

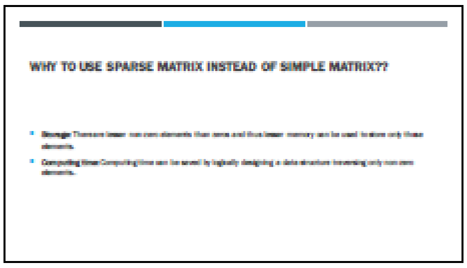


$$\begin{bmatrix} 0 & 0 & 0 & 0 & 9 & 0 \\ 0 & 8 & 0 & 0 & 0 & 0 \\ 4 & 0 & 0 & 2 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 5 \\ 0 & 0 & 2 & 0 & 0 & 0 \end{bmatrix}$$

Rows	Columns	Values
5	6	6
0	4	9
1	1	8
2	0	4
2	2	2
3	5	5
4	2	2

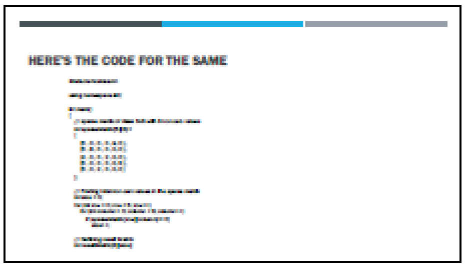
TRIPLET REPRESENTATION OF SPARSE MATRIX

[illegible]



WHY TO USE SPARSE MATRIX INSTEAD OF SIMPLE MATRIX??

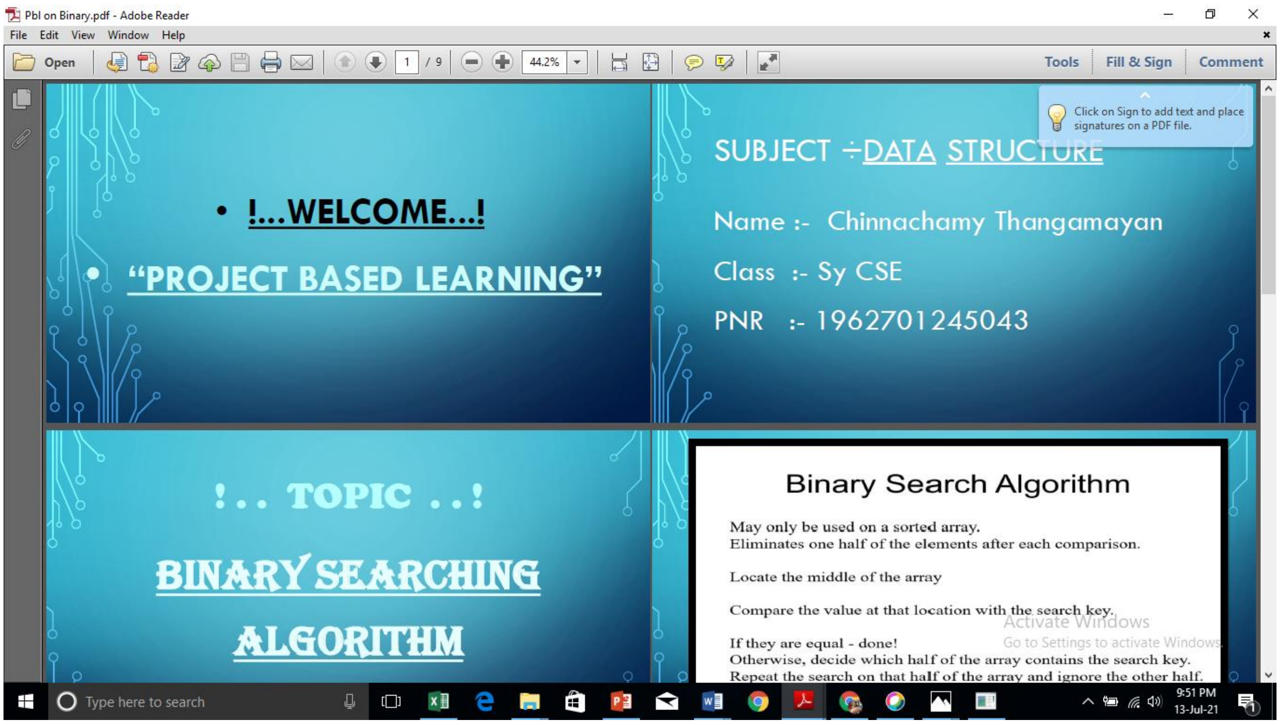
- Storage: There are lesser non-zero elements than zeros and thus lesser memory can be used to store only those elements.
- Computing time: Computing time can be saved by logically designing a data structure traversing only non-zero elements.



HERE'S THE CODE FOR THE SAME

[illegible]

Sample Response of Project Based Learning Activity- PowerPoint Presentation


Pbl on Binary.pdf - Adobe Reader
File Edit View Window Help
Open
1 / 9
44.2%
Tools
Fill & Sign
Comment
Click on Sign to add text and place signatures on a PDF file.
Activate Windows
Go to Settings to activate Windows.
Type here to search
9:51 PM
13-Jul-21

• !...WELCOME...!

• "PROJECT BASED LEARNING"

SUBJECT ÷DATA STRUCTURE

Name :- Chinnachamy Thangamayan

Class :- Sy CSE

PNR :- 1962701245043

!.. TOPIC ..!

BINARY SEARCHING ALGORITHM

Binary Search Algorithm

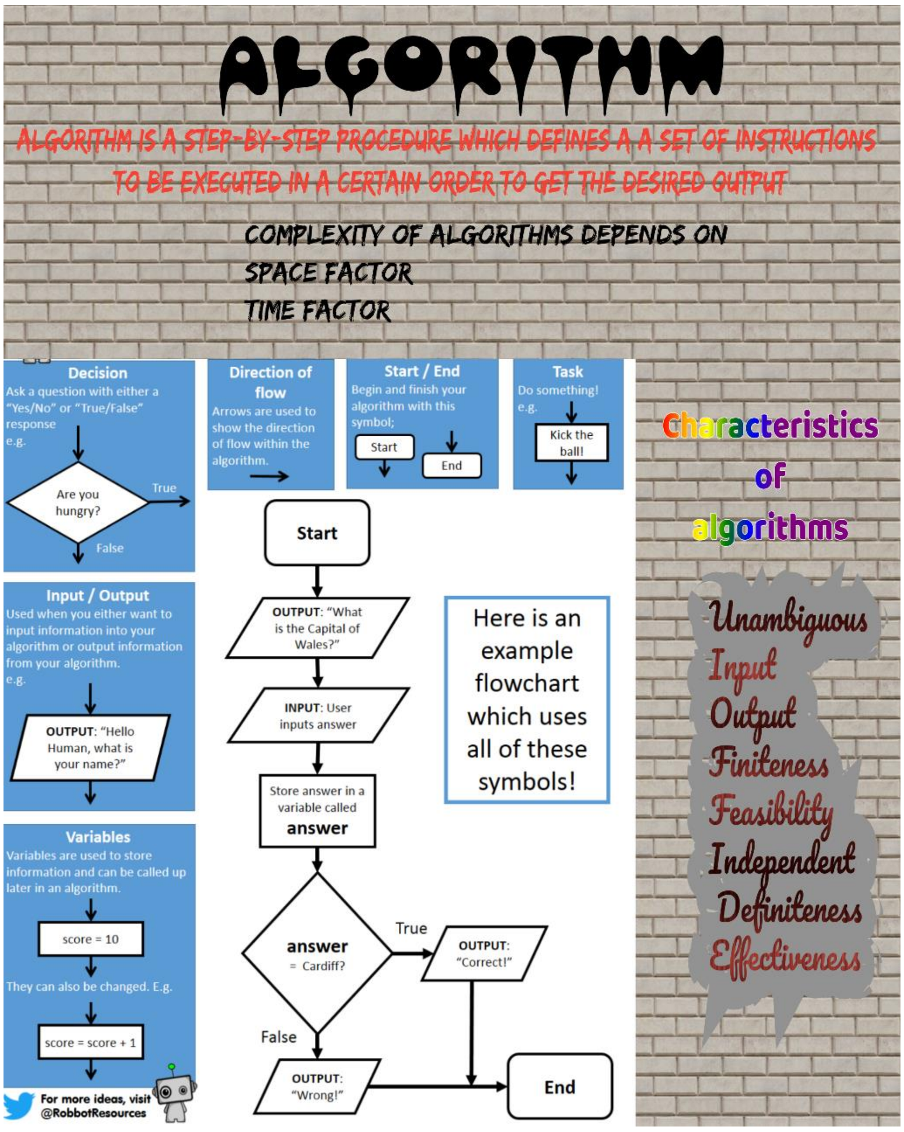
May only be used on a sorted array.
Eliminates one half of the elements after each comparison.

Locate the middle of the array

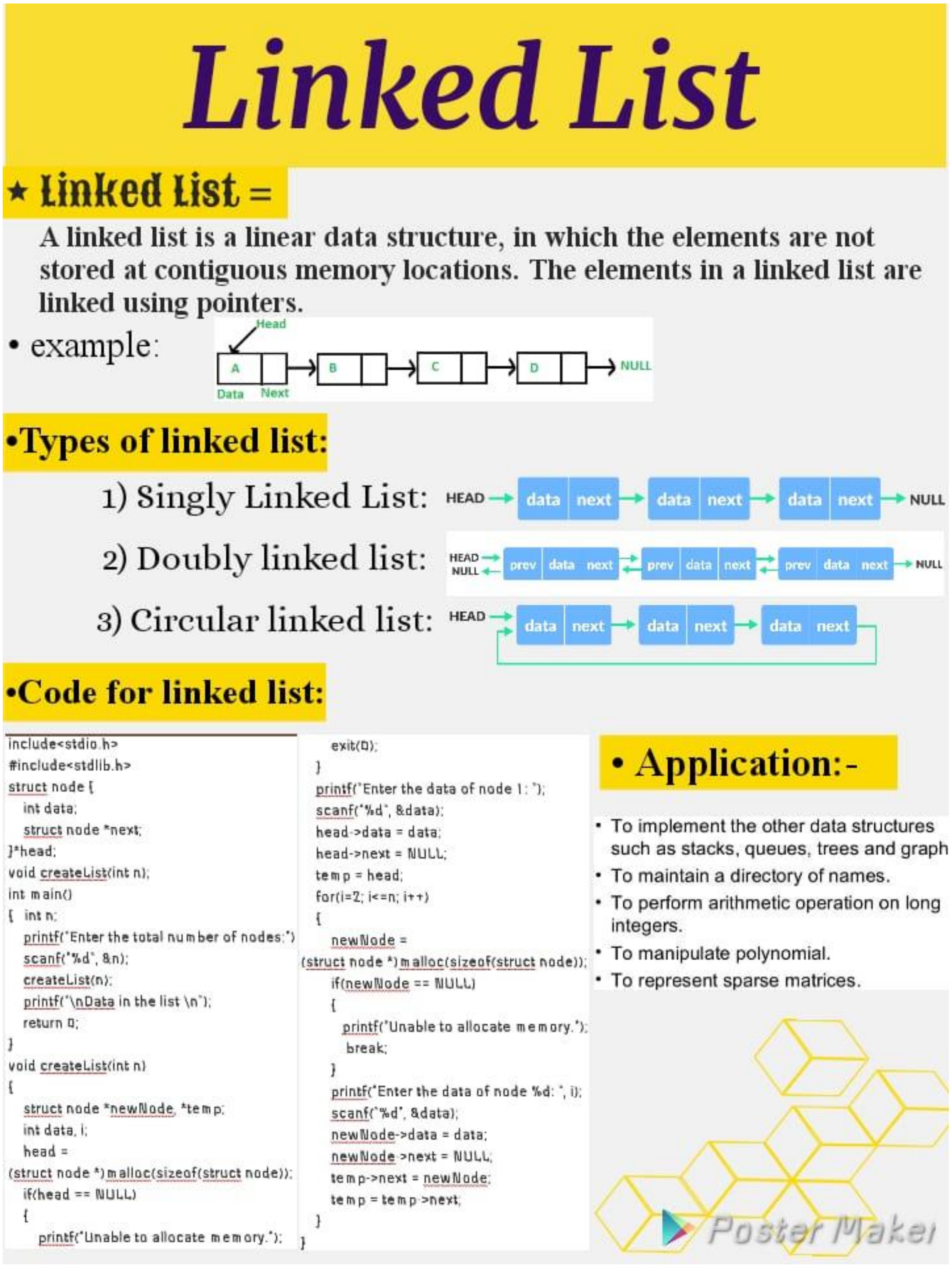
Compare the value at that location with the search key.

If they are equal - done!
Otherwise, decide which half of the array contains the search key.
Repeat the search on that half of the array and ignore the other half.

Sample Responses of Project Based Learning Activity- Poster Presentation


ALGORITHM
ALGORITHM IS A STEP-BY-STEP PROCEDURE WHICH DEFINES A A SET OF INSTRUCTIONS TO BE EXECUTED IN A CERTAIN ORDER TO GET THE DESIRED OUTPUT
COMPLEXITY OF ALGORITHMS DEPENDS ON
SPACE FACTOR
TIME FACTOR
Decision
Ask a question with either a "Yes/No" or "True/False" response e.g.
Are you hungry?
True
False
Direction of flow
Arrows are used to show the direction of flow within the algorithm.
Start / End
Begin and finish your algorithm with this symbol;
Start
End
Task
Do something! e.g.
Kick the ball!
Input / Output
Used when you either want to input information into your algorithm or output information from your algorithm. e.g.
OUTPUT: "Hello Human, what is your name?"
Variables
Variables are used to store information and can be called up later in an algorithm.
score = 10
They can also be changed. E.g.
score = score + 1
For more ideas, visit @RobbotResources
Start
OUTPUT: "What is the Capital of Wales?"
INPUT: User inputs answer
Store answer in a variable called answer
answer = Cardiff?
True
OUTPUT: "Correct!"
False
OUTPUT: "Wrong!"
End
Here is an example flowchart which uses all of these symbols!
Characteristics of algorithms
Unambiguous
Input
Output
Finiteness
Feasibility
Independent
Definiteness
Effectiveness

Sample Responses of Project Based Learning Activity- Poster Presentation

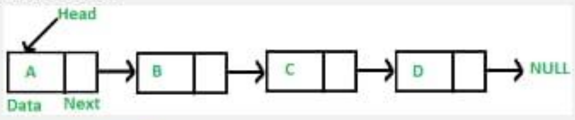


Linked List

★ Linked List =

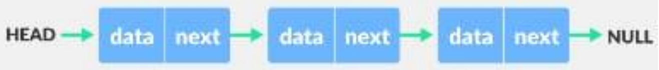
A linked list is a linear data structure, in which the elements are not stored at contiguous memory locations. The elements in a linked list are linked using pointers.

- example:

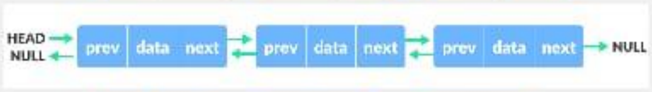


•Types of linked list:

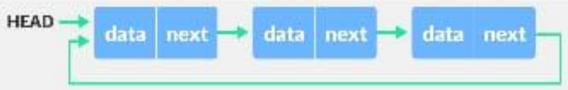
1) Singly Linked List:



2) Doubly linked list:



3) Circular linked list:



•Code for linked list:

```
include<stdio.h>
#include<stdlib.h>
struct node {
   int data;
   struct node *next;
}*head;
void createList(int n);
int main()
{  int n;
   printf("Enter the total number of nodes:")
   scanf("%d", &n);
   createList(n);
   printf("\nData in the list \n");
   return 0;
}
void createList(int n)
{
   struct node *newNode, *temp;
   int data, i;
   head =
(struct node *)malloc(sizeof(struct node));
   if(head == NULL)
   {
      printf("Unable to allocate memory.");
      exit(0);
   }
   printf("Enter the data of node 1: ");
   scanf("%d", &data);
   head->data = data;
   head->next = NULL;
   temp = head;
   for(i=2; i<=n; i++)
   {
      newNode =
(struct node *)malloc(sizeof(struct node));
      if(newNode == NULL)
      {
        printf("Unable to allocate memory.");
         break;
      }
      printf("Enter the data of node %d: ", i);
      scanf("%d", &data);
      newNode->data = data;
      newNode->next = NULL;
      temp->next = newNode;
      temp = temp->next;
   }
}
```

• Application:-

- To implement the other data structures such as stacks, queues, trees and graph
- To maintain a directory of names.
- To perform arithmetic operation on long integers.
- To manipulate polynomial.
- To represent sparse matrices.

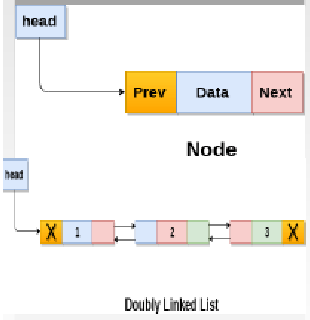
Poster Maker

Sample Responses of Project Based Learning Activity- Program Based Poster Presentation along with executable code.

Doubly Linked List

WHAT IS DLL?

Doubly linked list is a complex type of linked list in which a node contains a pointer to the previous as well as the next node in the sequence. Therefore, in a doubly linked list, a node consists of three parts: node data, pointer to the next node in sequence (next pointer) , pointer to the previous node (previous pointer).

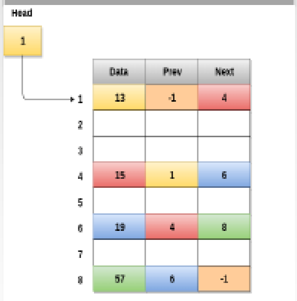


Doubly Linked List

```
struct node
{
    struct node *prev;
    int data;
    struct node *next;
}
```

Memory Representation

Generally, doubly linked list consumes more space for every node and therefore, causes more expansive basic operations such as insertion and deletion. However, we can easily manipulate the elements of the list since the list maintains pointers in both the directions (forward and backward).



	Data	Prev	Next
1	13	-1	4
2			
3			
4	15	1	6
5			
6	19	4	8
7			
8	57	6	-1

Memory Representation of a Doubly linked list

```
struct node
{
    struct node *prev;
    int data;
    struct node *next;
};
struct node *head;
```

Operations

1.Insertion at beginning
2.Insertion at end
3.Insertion after specified node
4.Deletion at beginning
5.Deletion at the end
6.Deletion of the node having given data
7.Searching
8.Traversing

An example problem

Design a data structure that supports following operations efficiently:

1.getMin : Gets minimum
2.extractMin : Removes minimum
3.getMax : Gets maximum
4.extractMax : Removes maximum
5.insert : Inserts an item. It may be assumed that the inserted item is always greater than maximum so far. e.g, a valid insertion order is 10, 12, 13, 20.

Doubly linked list is the best solution here. We maintain head and tail pointers, since inserted item is always greatest, we insert at tail. Deleting an item from head or tail can be done in O(1) time. So all operations take O(1) time.

Applications of linked list in real world

1.*Image viewer* – Previous and next images are linked, hence can be accessed by next and previous button.

2.*Previous and next page in web browser* – We can access previous and next URL searched in web browser by pressing back and next button since, they are linked as linked list.

3.*Music Player* – Songs in music player are linked to previous and next song. you can play songs either from starting or ending of the list.

Sample Output

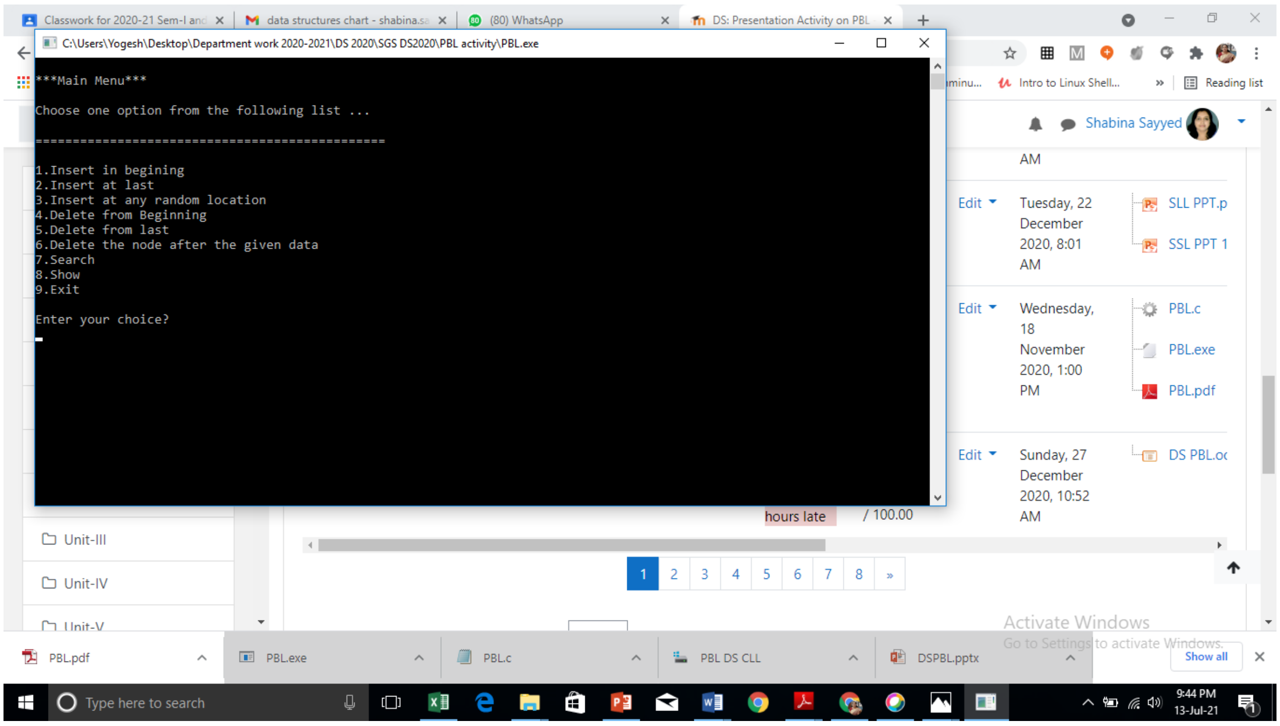
```
***Main Menu***

Choose one option from the following list ...

===============================================

1.Insert in begining
2.Insert at last
3.Insert at any random location
4.Delete from Beginning
5.Delete from last
6.Delete the node after the given data
7.Search
8.Show
9.Exit

Enter your choice?
```


Classwork for 2020-21 Sem-I and
data structures chart - shabina.s
(80) WhatsApp
DS: Presentation Activity on PBL
C:\Users\Yogesh\Desktop\Department work 2020-2021\DS 2020\SGS DS2020\PBL activity\PBL.exe
Intro to Linux Shell...
Reading list
Shabina Sayyed
Edit
Tuesday, 22 December 2020, 8:01 AM
SLL PPT.p
SSL PPT 1
Wednesday, 18 November 2020, 1:00 PM
PBL.c
PBL.exe
PBL.pdf
Sunday, 27 December 2020, 10:52 AM
DS PBL.o
hours late
/ 100.00
Unit-III
Unit-IV
Unit-V
1 2 3 4 5 6 7 8 »
Activate Windows
Go to Settings to activate Windows.
PBL.pdf
PBL.exe
PBL.c
PBL DS CLL
DSPBL.pptx
Show all
Type here to search
9:44 PM
13-Jul-21

```
***Main Menu***

Choose one option from the following list ...

===============================================

1.Insert in begining
2.Insert at last
3.Insert at any random location
4.Delete from Beginning
5.Delete from last
6.Delete the node after the given data
7.Search
8.Show
9.Exit

Enter your choice?
```

Dr. Shabina Sayyed
Course Coordinator