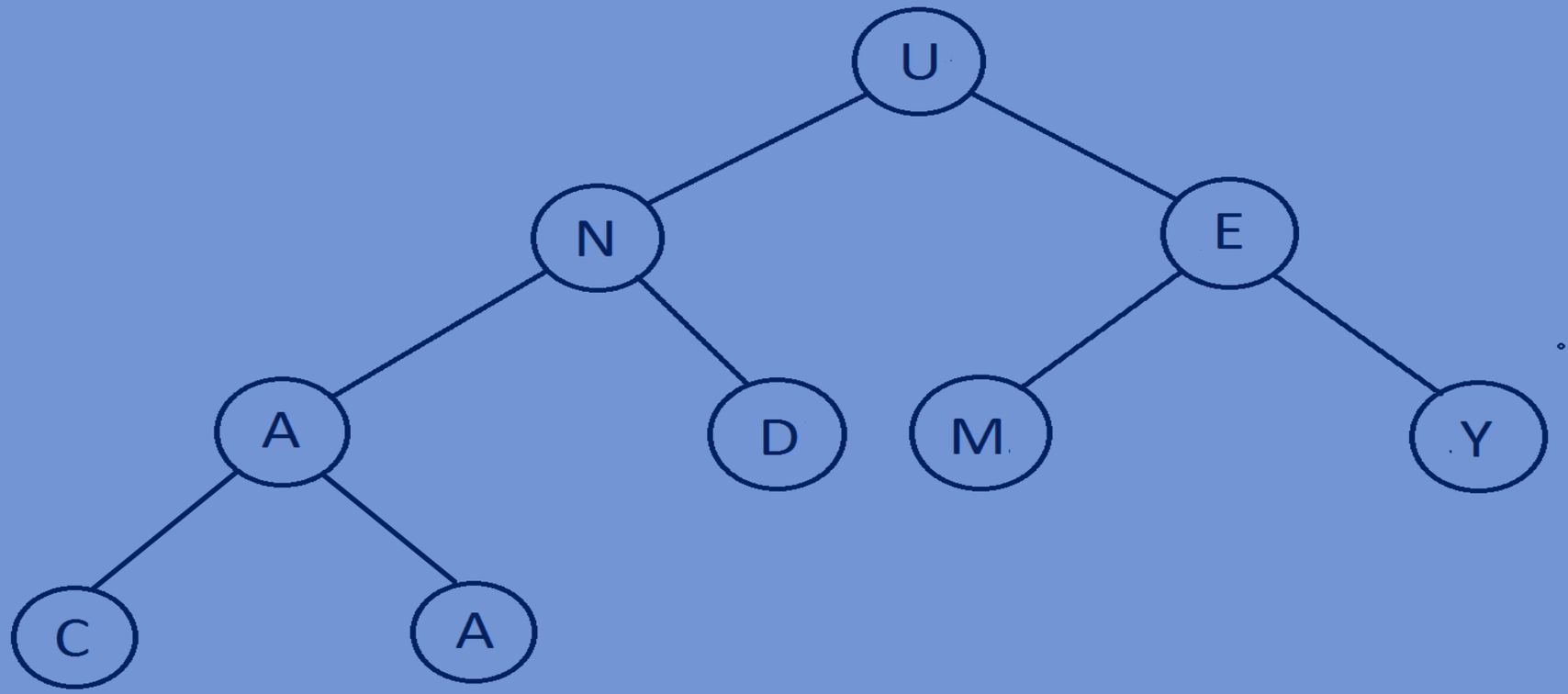
Data Structures

Implementation of Breadth first Traversal

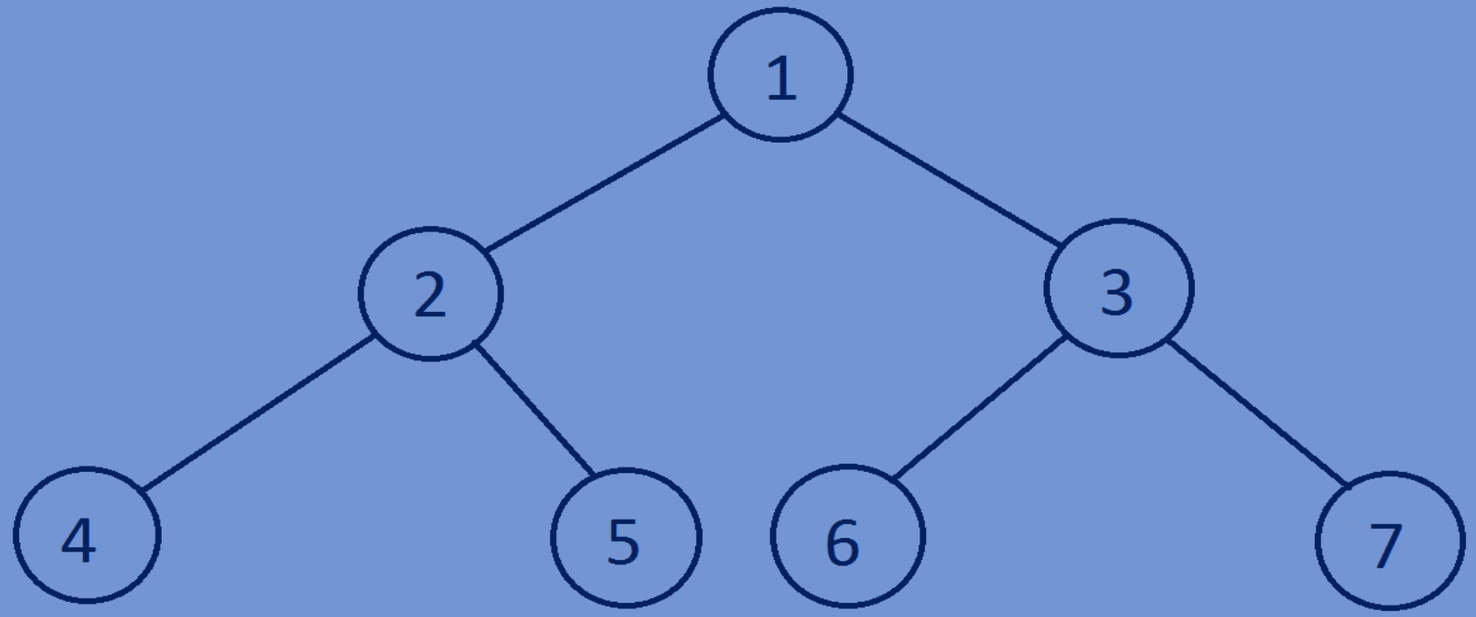
Breadth first traversal:

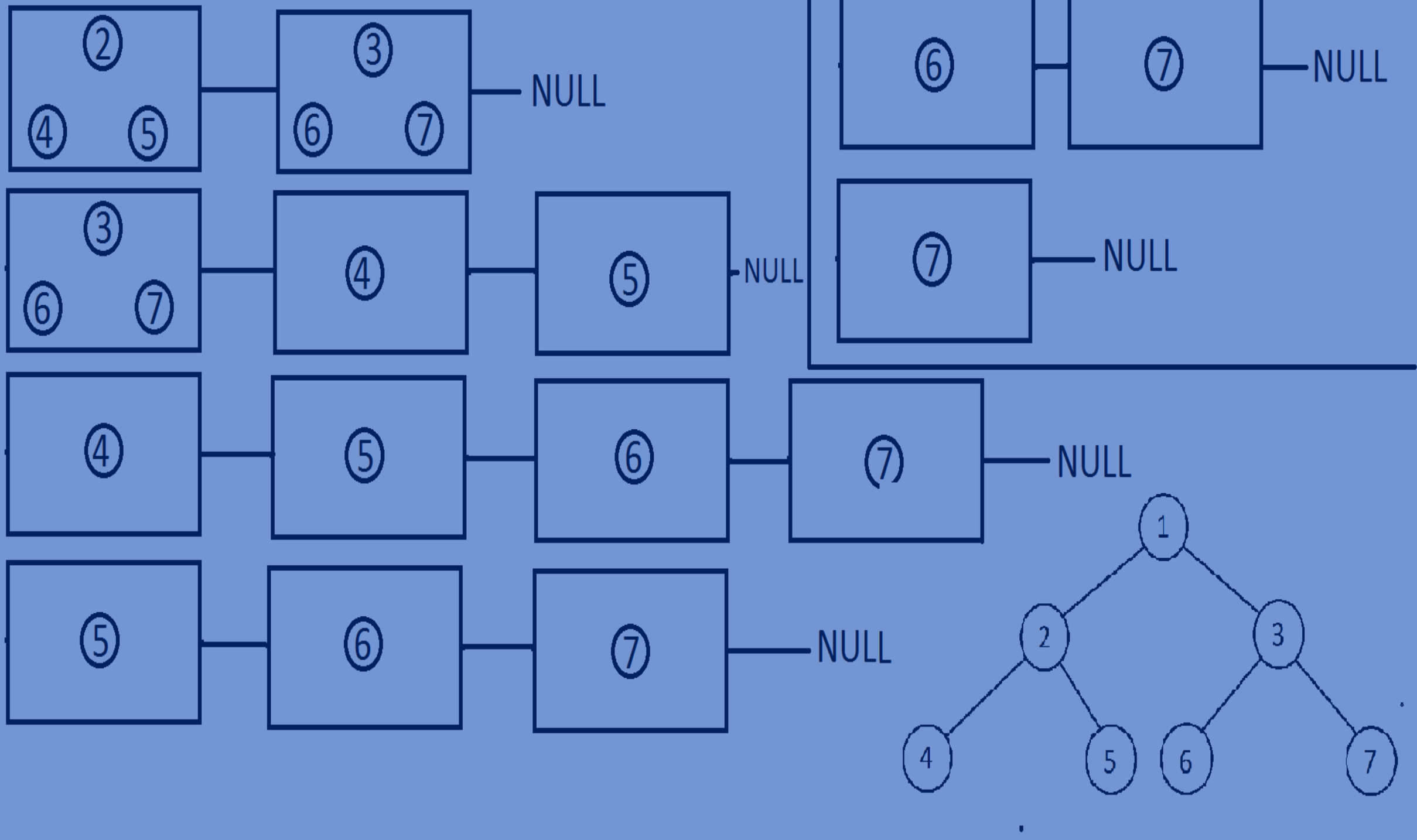
- → The process of visiting all the nodes of a tree level by level is called as breadth First traversal.
- → Breadth first traversal for the following tree is U N E A D M Y C A



Implementation of Breadth first traversal:

→ First print the data of the root node, if left pointer of the root node is not Equal to null then insert the left subtree of the root node into Queue(enqueue) and if the right pointer of the root node is not equal to Null then insert the right subtree of the root node into Queue(enqueue). At the end of each iteration make the data(tree) of the first node as the binary tree And then pop(dequeue) the first node of the queue.




2
4
5
3
6
7
NULL
3
6
7
4
5
NULL
6
7
NULL
7
NULL
4
5
6
7
NULL
5
6
7
NULL
1
2
3
4
5
6
7

Function for printing of all the the elements of a tree level by level:

```
void LevelOrder(Btree * root)
{
    lin_list *q=NULL;
    Btree *var=root;
    while(var!=NULL) {
        printf("%d ",var->data1);
        if(var->left!=NULL)
        {
            q=enqueue(q,var->left);
        }
        if(var->right!=NULL)
        {
            q=enqueue(q,var->right);
        }
        if(q==NULL){
            break;
        }
        var=q->data;
        q=dequeue(q);
    }
}
```

Whole program:

```c
#include<stdio.h>
#include<stdlib.h>

//creating a Binary tree node.
typedef struct Btree{
    int data1;
    struct Btree *left;
    struct Btree *right;
}Btree;
//creating a linked list node.
typedef struct lin_list{
    Btree *data;
    struct lin_list *next;
}lin_list;
//function for inserting nodes at the end of a linked list
lin_list *enqueue(lin_list *head,Btree *tree){
    lin_list *newnode=(lin_list*)malloc(sizeof(lin_list));
    newnode->data=tree;
    newnode->next=NULL;
    lin_list *temp=head;
```

```
    if(head==NULL){
        head=newnode;
    }
    else {
        while (temp->next != NULL) {
            temp = temp->next;
        }
        temp->next = newnode;
    }
    return head;
}
//function for popping of first node of a linked list
lin_list *dequeue(lin_list *head){
    lin_list *temp=head;
    head=head->next;
    free(temp);
    return head;
}
//create newnode
Btree *newnode(int data){
    Btree *tree=(Btree*)malloc(sizeof(Btree));
    tree->data1=data;
    tree->left=NULL;
    tree->right=NULL;
```

```
    return tree;
}
//level order traversal of a tree
void LevelOrder(Btree * root)
{
    lin_list *q=NULL;
    Btree *var=root;
    while(var!=NULL) {
        printf("%d ",var->data1);
        if(var->left!=NULL)
        {
            q=enqueue(q,var->left);
        }
        if(var->right!=NULL)
        {
            q=enqueue(q,var->right);
        }
        if(q==NULL){
            break;
        }
        var=q->data;
        q=dequeue(q);
    }
}
```

```
//main function
int main(){
    Btree *tree;
    tree=newnode(1);
    tree->left=newnode(2);
    tree->right=newnode(3);
    tree->left->left=newnode(4);
    tree->left->right=newnode(5);
    tree->right->left=newnode(6);
    tree->right->right=newnode(7);
    LevelOrder(tree);
    return 0;
}
```

Output:

```
1 2 3 4 5 6 7
```