This is CS50

CS50 IDE

```
check50

debug50

help50

printf

style50
```

valgrind

ddb50

ddb
50

string

```
char *
```

crucial
by Micron
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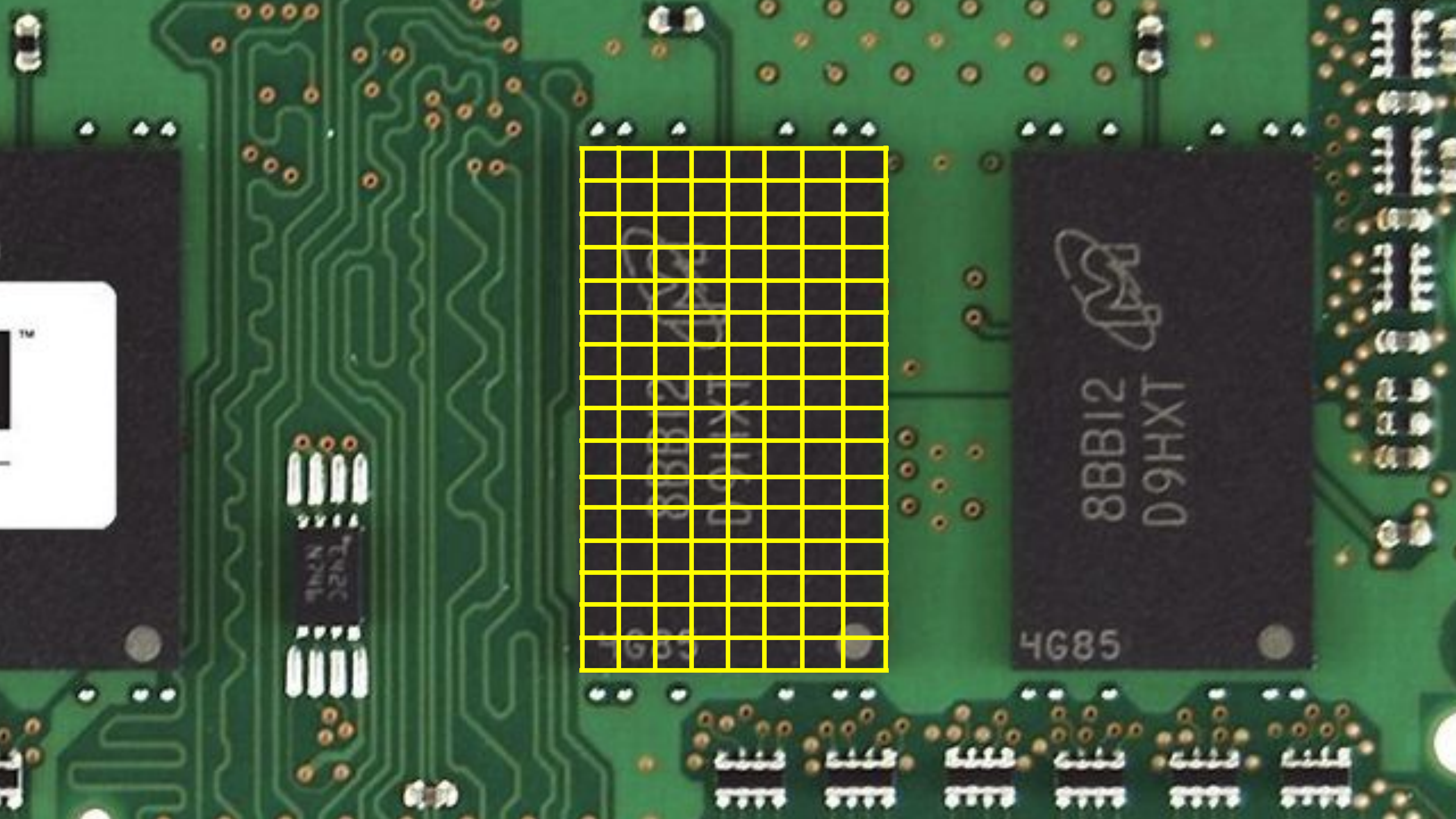
94V-0
8BBI2
D9HXT
8BBI2
D9HXT
47J6
4G85
4G85
4G85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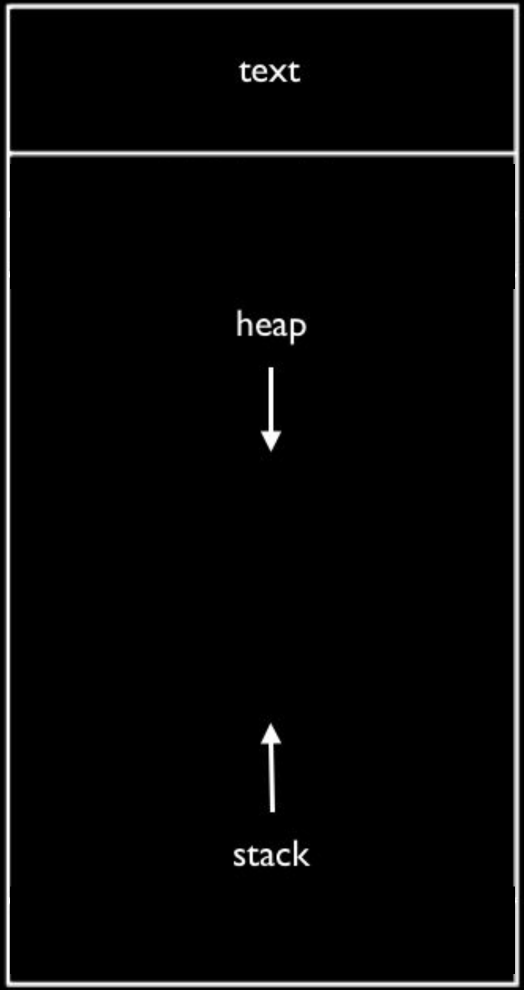


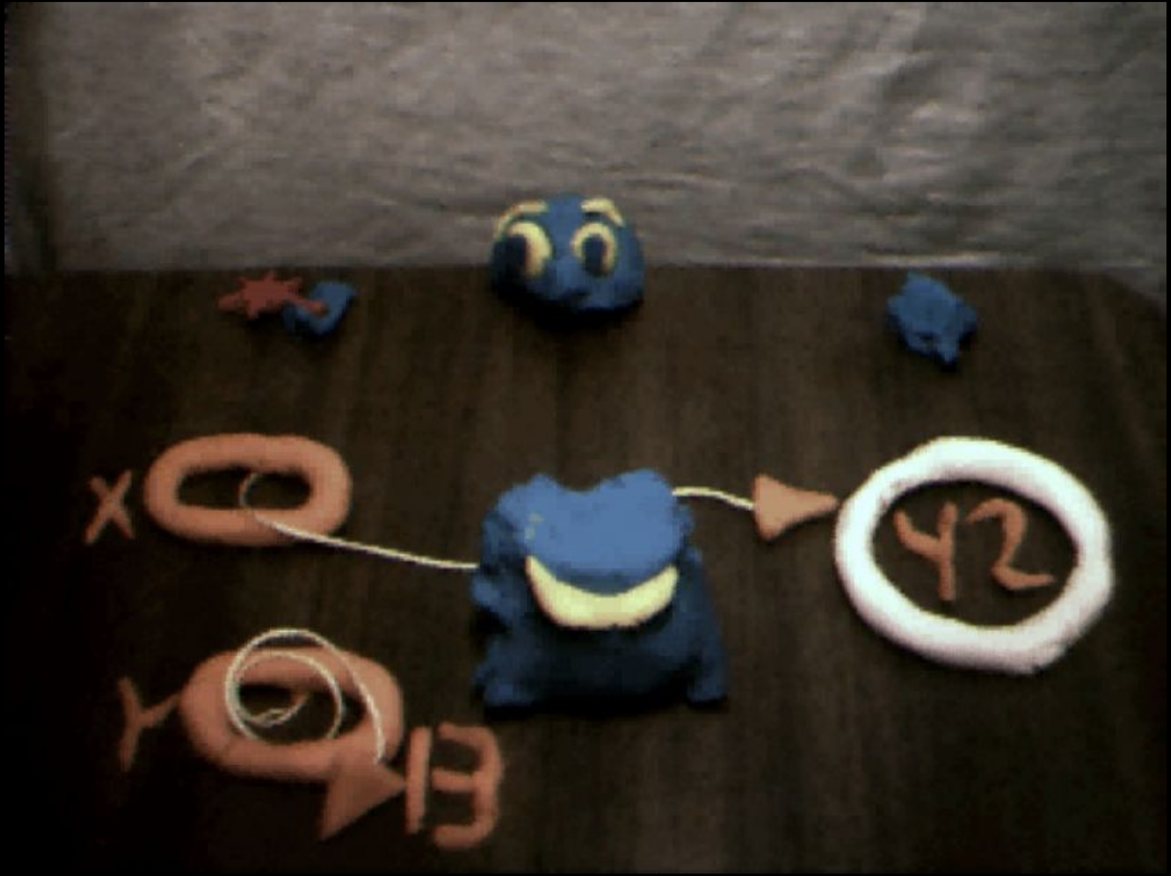
text

heap

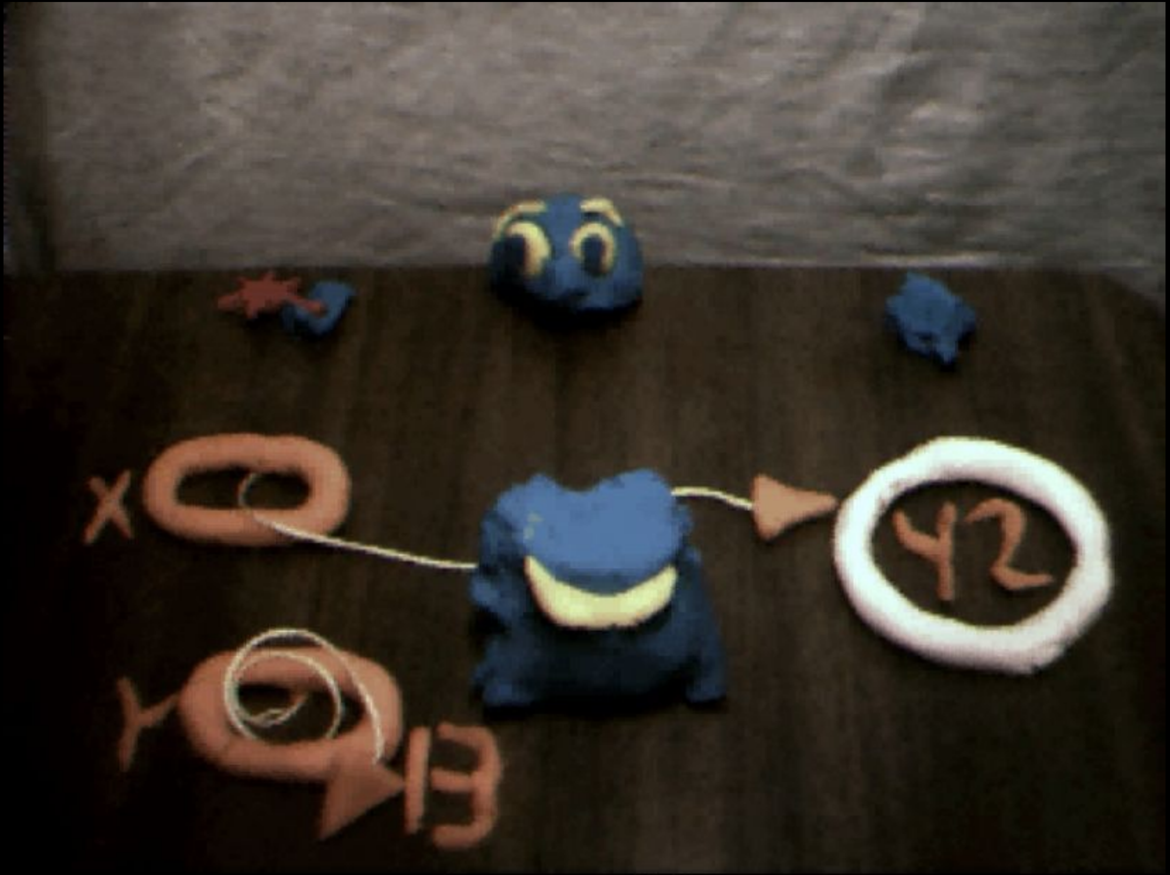
stack

```
void swap(int a, int b)
{
    int tmp = a;
    a = b;
    b = tmp;
}
```

```c
void swap(int *a, int *b)
{
    int tmp = *a;
    *a = *b;
    *b = tmp;
}
```



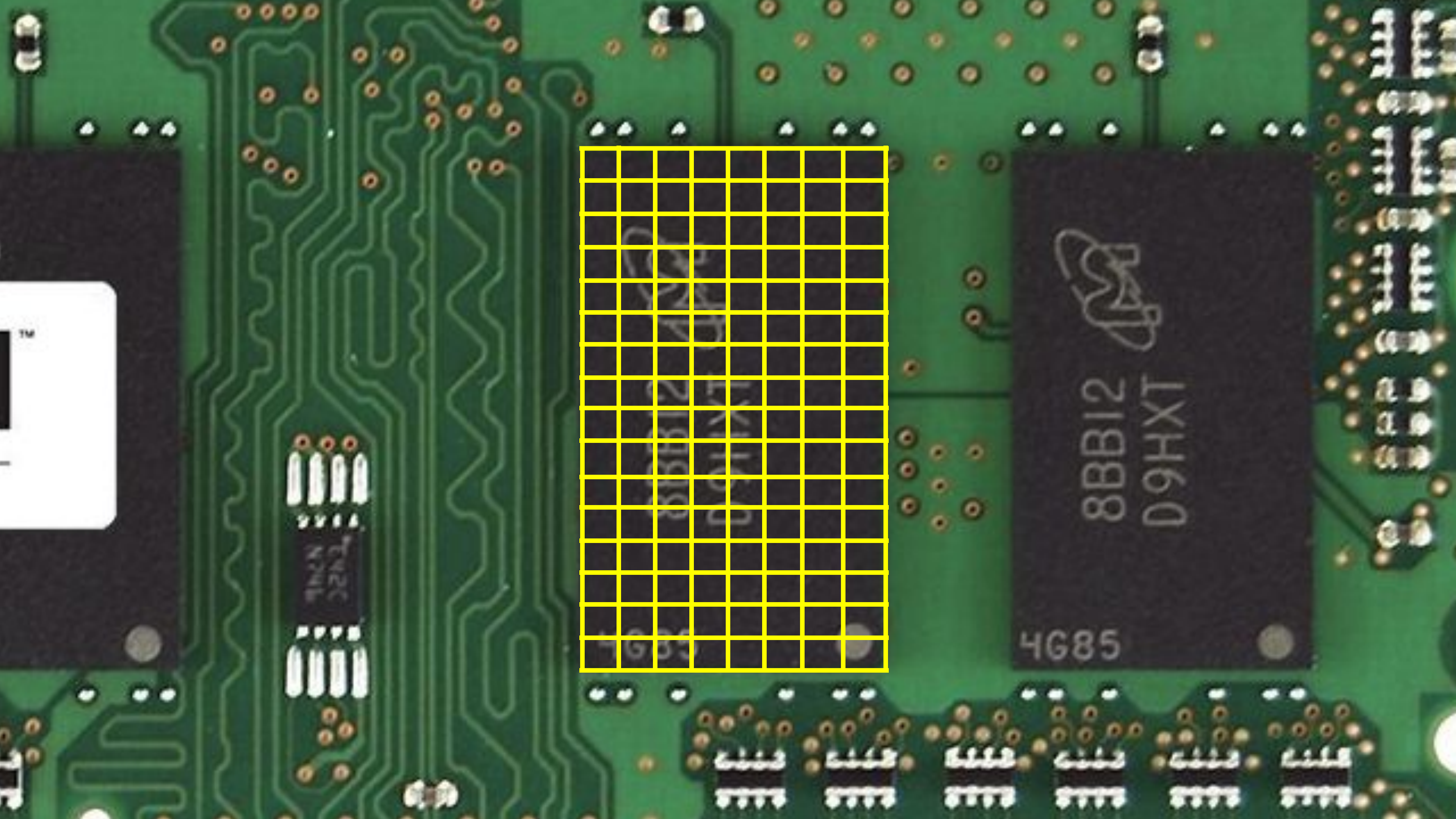
X
Y
13
42



```
*y = 13;
```

```
int main(void)
{
    int *x;
    int *y;

    x = malloc(sizeof(int));

    *x = 42;
    *y = 13;

    y = x;

    *y = 13;
}
```

`struct`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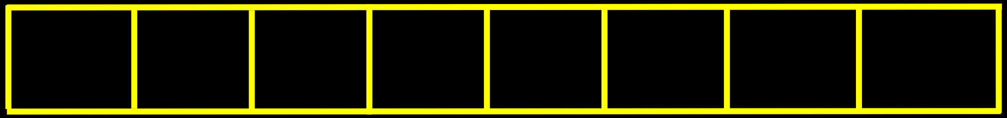


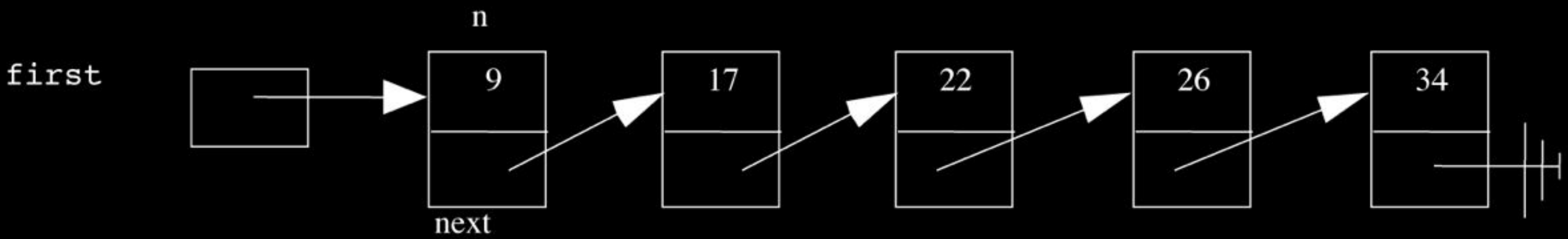
array

linked list

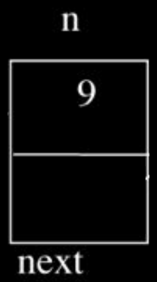
tree

hash table

trie



https://cs.calvin.edu/activities/books/c++/ds/1e/



https://cs.calvin.edu/activities/books/c++/ds/1e/

```
string name;
string dorm;
```

```
typedef struct
{
    string name;
    string dorm;
}
student;
```

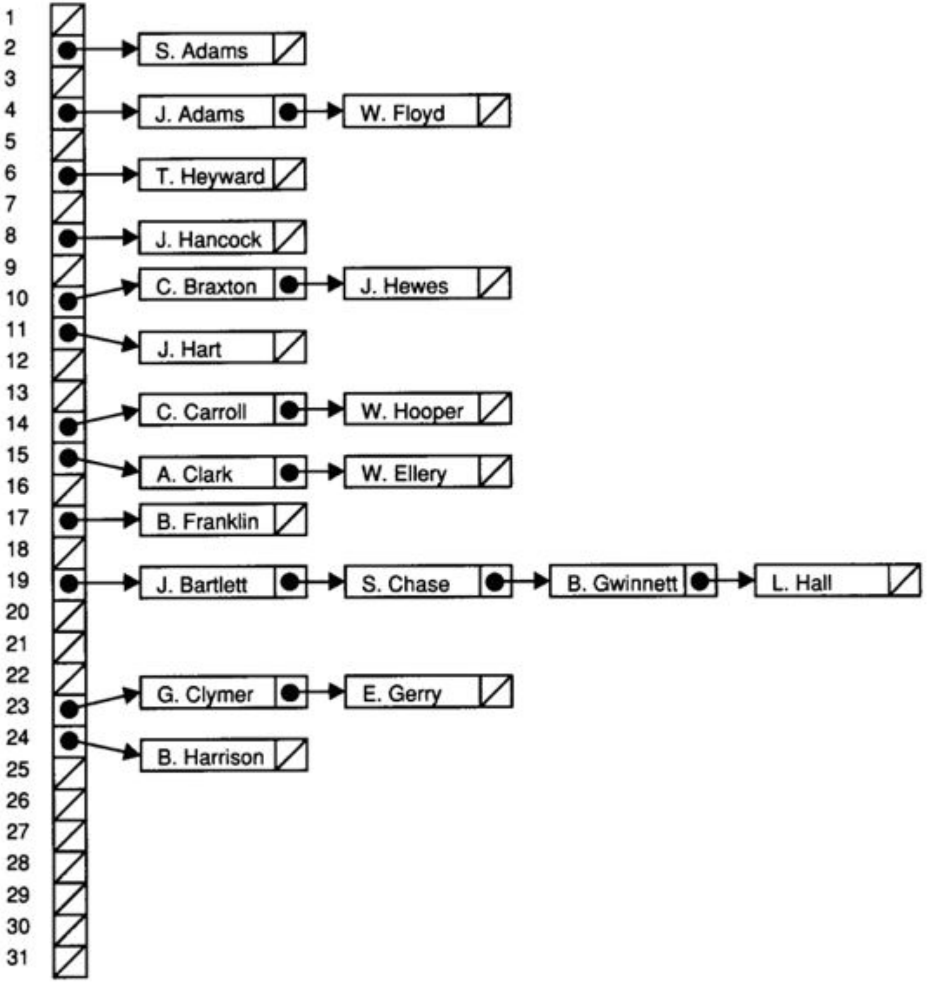
```
int n;
```

```
typedef struct node
{
    int n;

}
node;
```

```
typedef struct node
{
    int n;
           node *next;
}
node;
```

```
typedef struct node
{
    int n;
    struct node *next;
}
node;
```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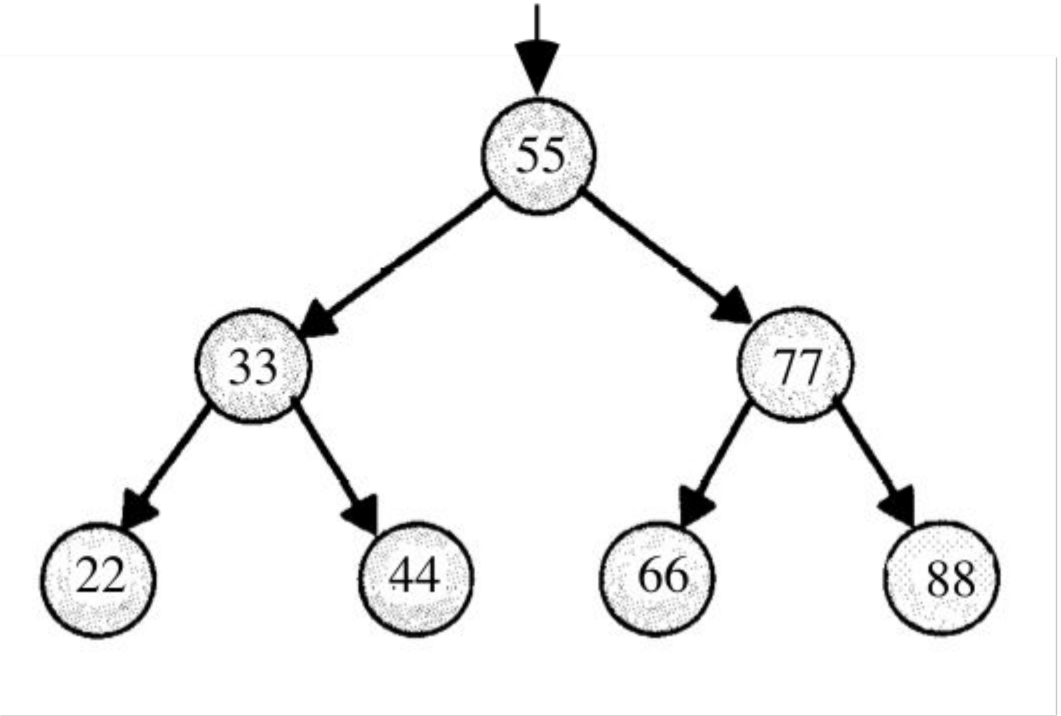
31
S. Adams
J. Adams
W. Floyd
T. Heyward
J. Hancock
C. Braxton
J. Hewes
J. Hart
C. Carroll
W. Hooper
A. Clark
W. Ellery
B. Franklin
J. Bartlett
S. Chase
B. Gwinnett
L. Hall
G. Clymer
E. Gerry
B. Harrison



https://cs.calvin.edu/activities/books/c++/ds/1e/

```
int n;
```

```
typedef struct node
{
    int n;


}
node;
```

```
typedef struct node
{
    int n;
    struct node *left;
    struct node *right;
}
node;
```

```
bool search(int n, node *tree)
{
    if (tree == NULL)
    {
        return false;
    }
    else if (n < tree->n)
    {
        return search(n, tree->left);
    }
    else if (n > tree->n)
    {
        return search(n, tree->right);
    }
    else
    {
        return true;
    }
}
```

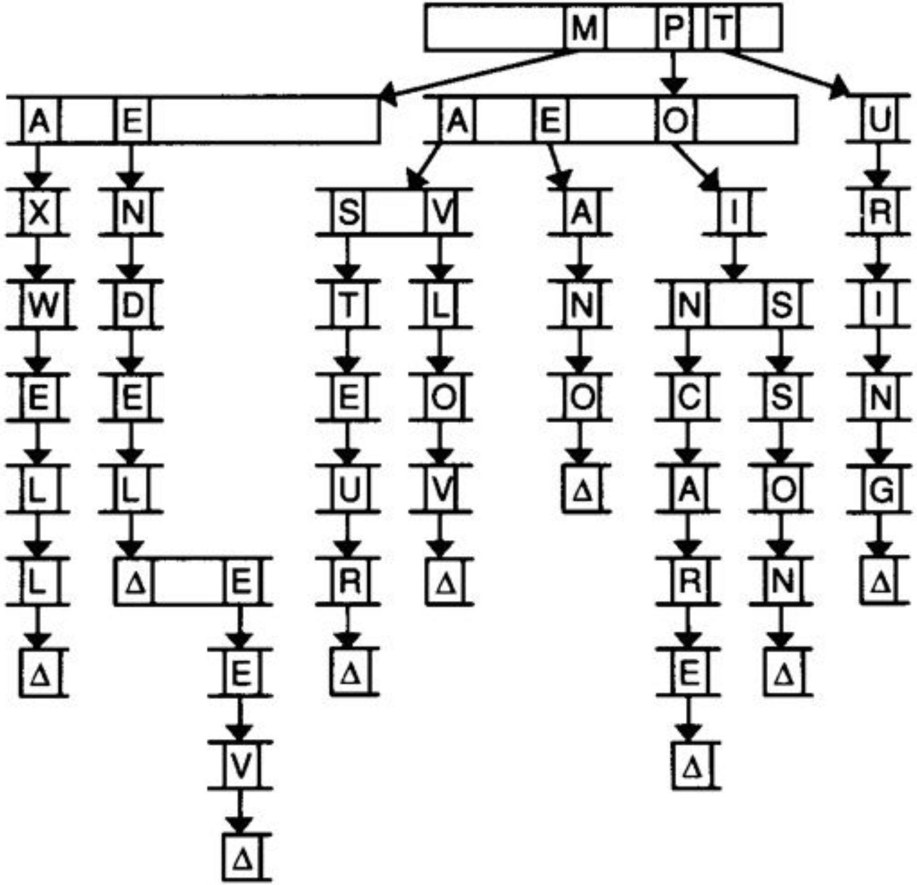


Figure from Lewis and Denenberg’s Data Structures & Their Algorithms.

This is CS50