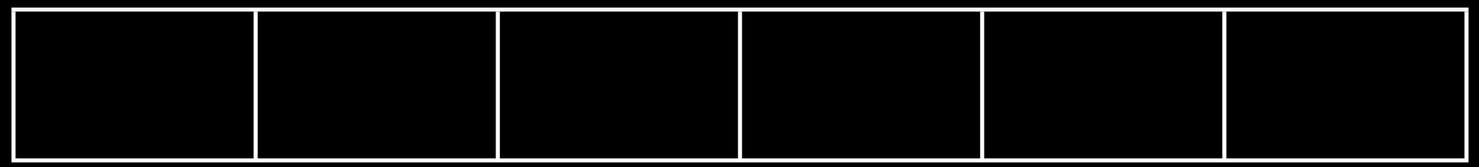
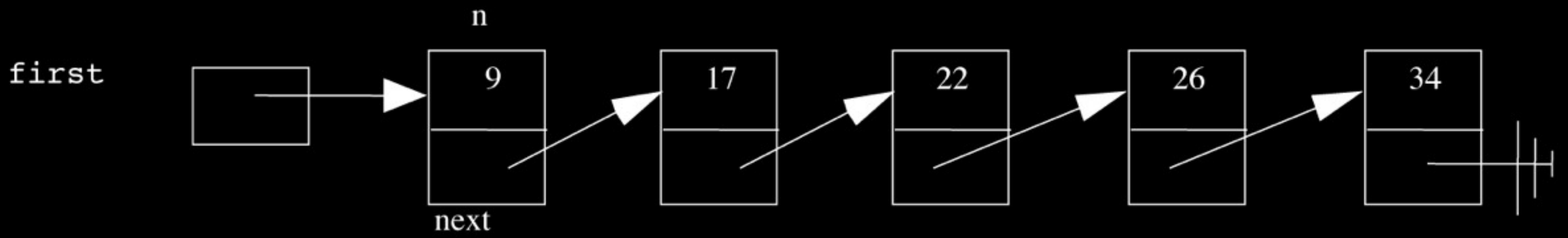
week 7, continued

arrays




n
first
9
17
22
26
34
next

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

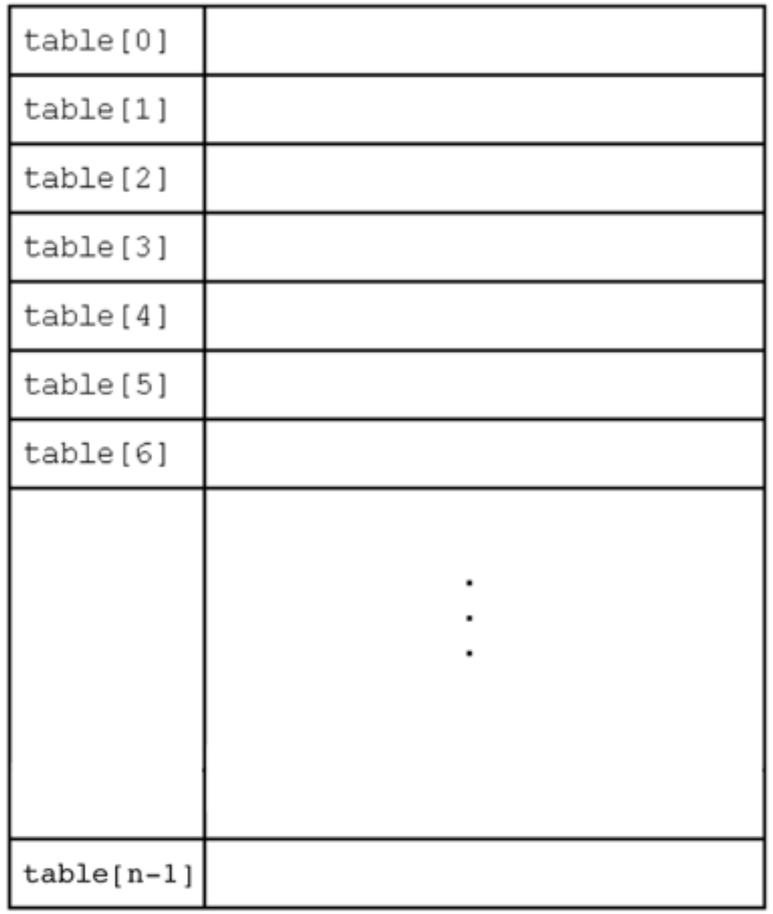
```
bool search(int n, node* list)
{
    node* ptr = list;
    while (ptr != NULL)
    {
        if (ptr->n == n)
        {
            return true;
        }
        ptr = ptr->next;
    }
    return false;
}
```

$O(1)$

hash table

table[0]	
table[1]	
table[2]	
table[3]	
table[4]	
table[5]	
table[6]	
	. . .
table[24]	
table[25]	

hash table



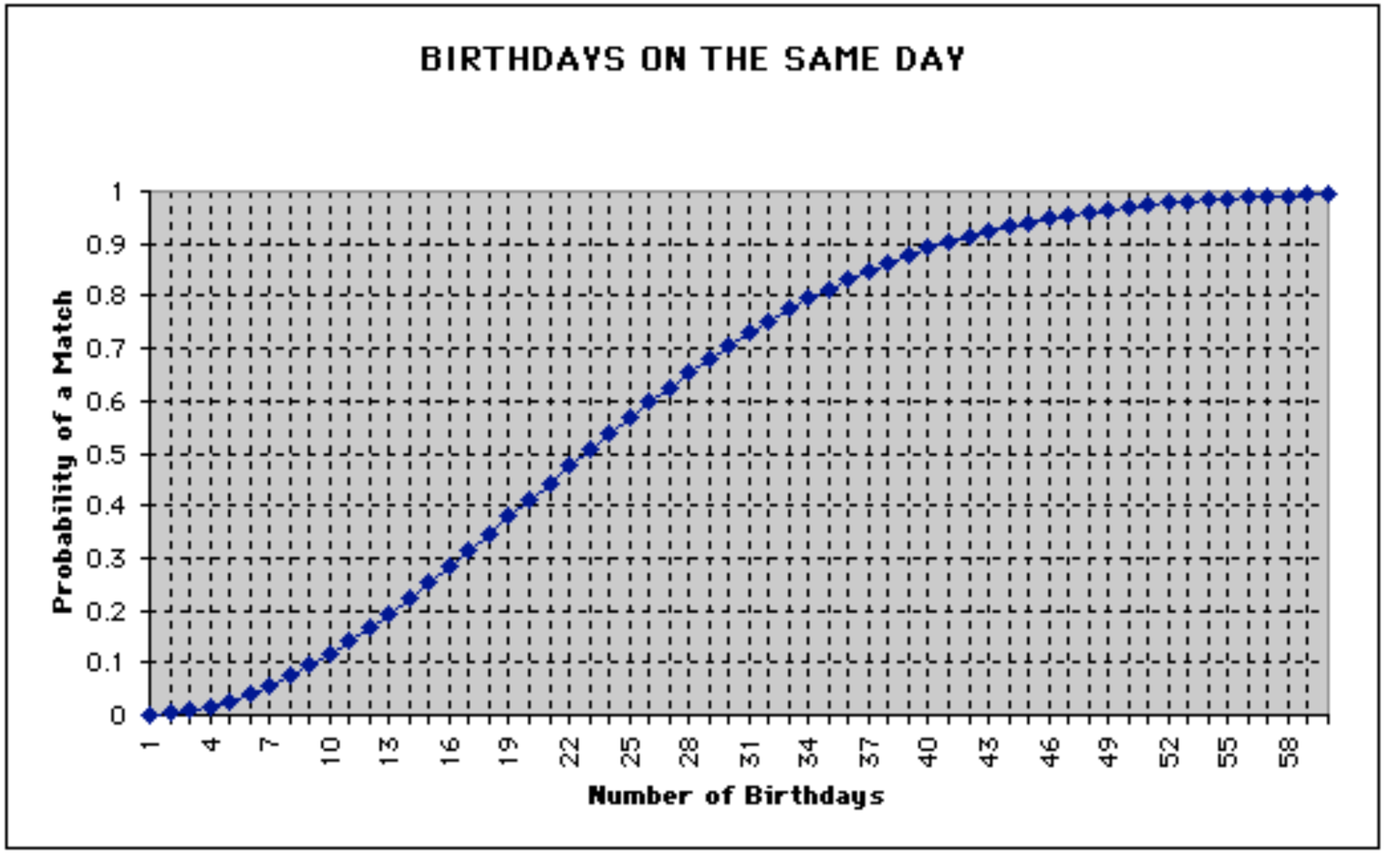
In a room of *n* CS50 students, what's the probability that at least 2 students have the same birthday?

$$\bar{p}(n) = 1 \cdot \left(1 - \frac{1}{365}\right) \cdot \left(1 - \frac{2}{365}\right) \cdots \left(1 - \frac{n-1}{365}\right)$$

http://en.wikipedia.org/wiki/Birthday_paradox

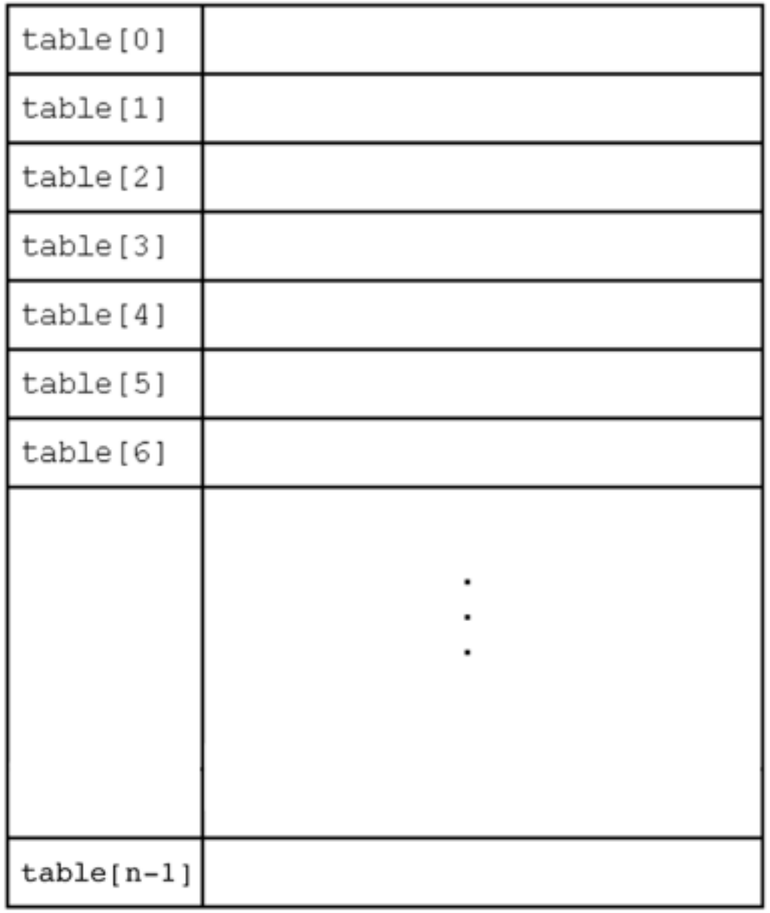
$$= \frac{365!}{365^n(365-n)!}$$

http://en.wikipedia.org/wiki/Birthday_paradox

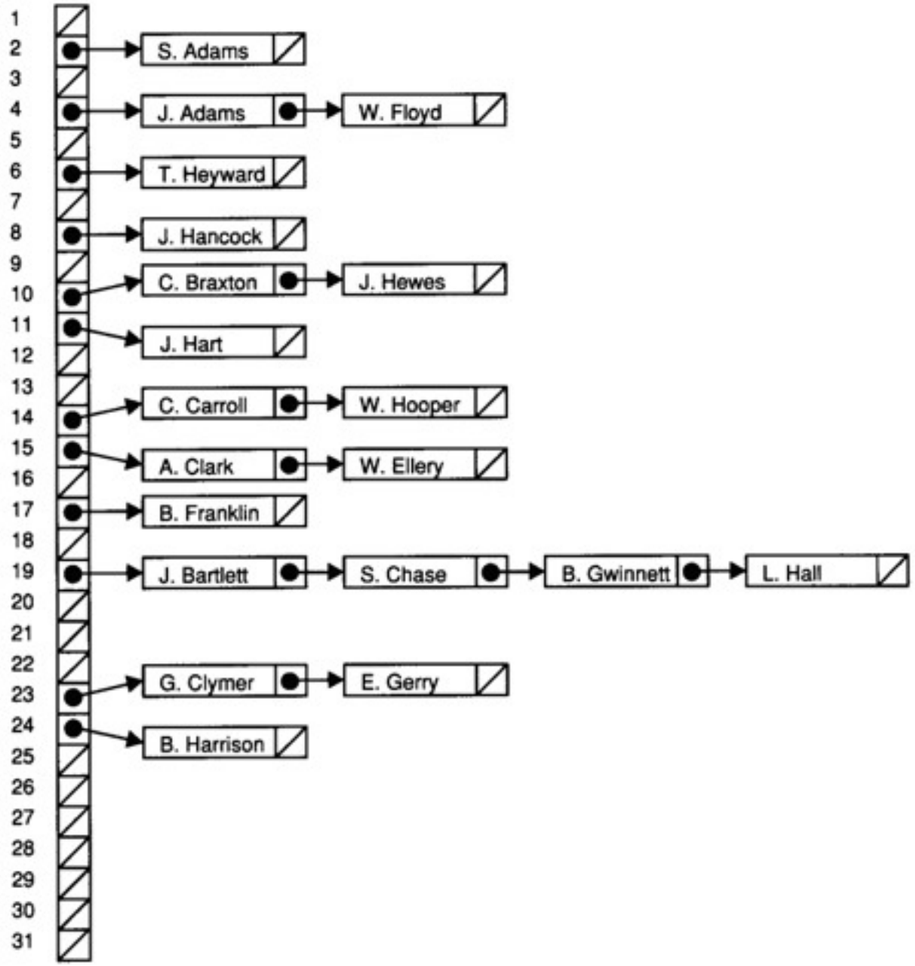


http://www.mste.uiuc.edu/reese/birthday/probchart.GIF

linear probing



separate chaining



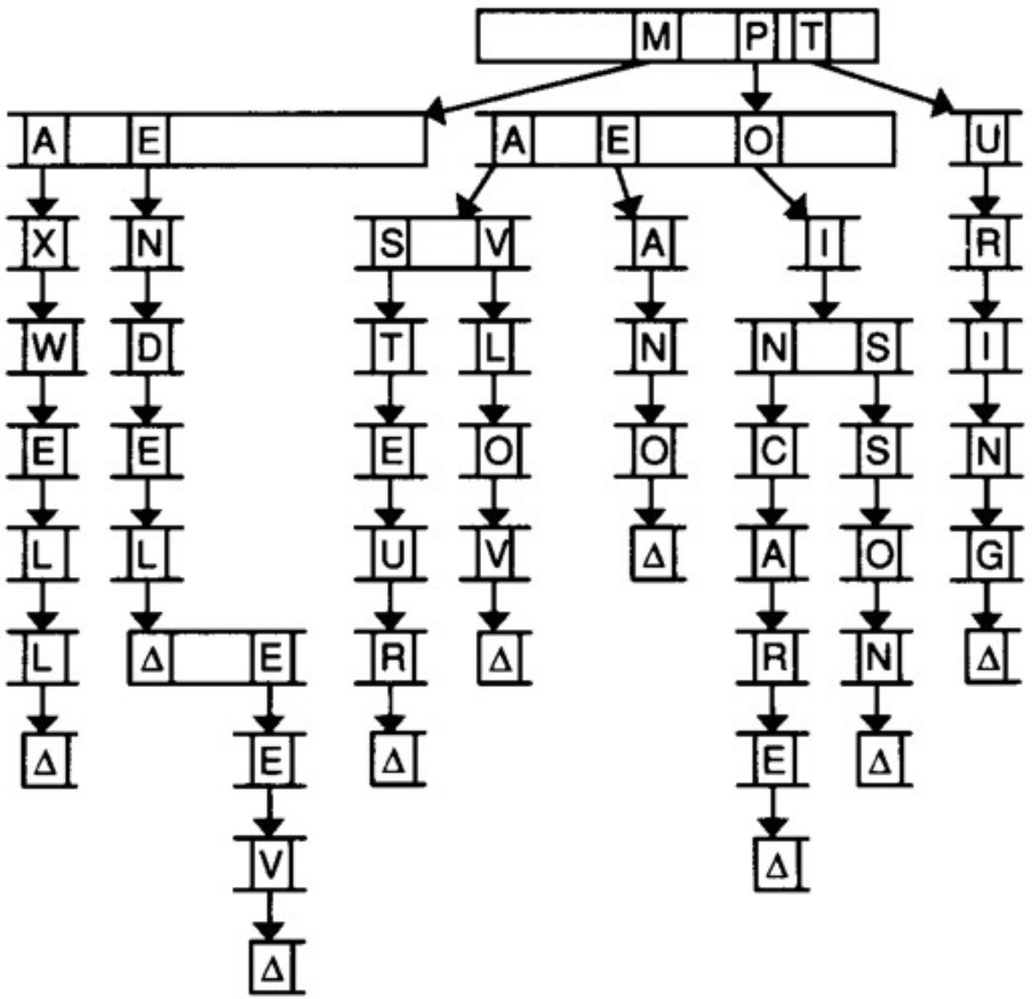


Figure from Lewis and Denenberg's Data Structures & Their Algorithms.

```
typedef struct node
{
    bool word;
    struct node* children[27];
}
node;
```

HTML

http://en.wikipedia.org/w/index.php?title=File:HTML5-logo.svg&page=1

to be continued...