

- Formal Methods in Software Engineering

Notorious Bugs — *BYTE*, September 1995

<http://www.byte.com/art/9509/sec7/art20.htm>

- 1987 : Therac-25 – The Bug that killed

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<http://www.byte.com/art/9509/sec7/art20.htm>

- 1990: AT&T long distance break down

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<http://www.byte.com/art/9509/sec7/art20.htm>

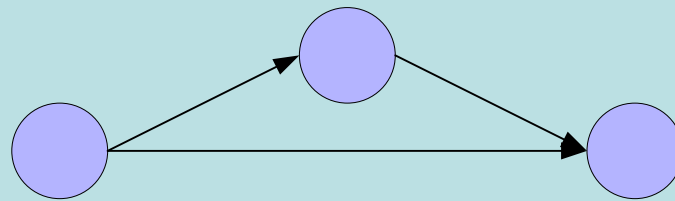
- 1991: Patriot Missile – Hitting own barracks, leaving 28 dead and 98 wounded.

- Program to test for two equal strings
- Test cases:
 - isEqual (“cat”, “dog”) - expected **false**
 - isEqual (“Testing”, “Testing”) - expected **true**
 - isEqual (“house”, “home”) - expected **false**

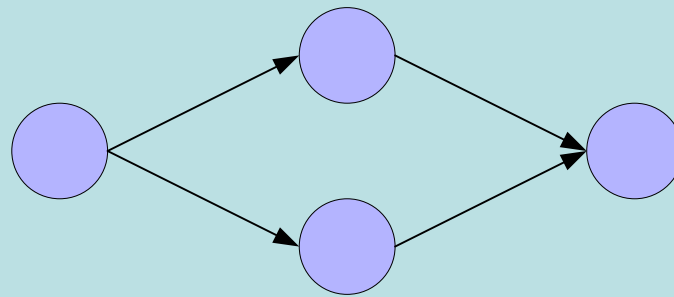
```
equal = strlen(string1) == strlen(string2);  
if (equal)  
    for (i = 0; i < strlen(string1); i++)  
        equal = string1[i] == string2[i];  
return equal;
```



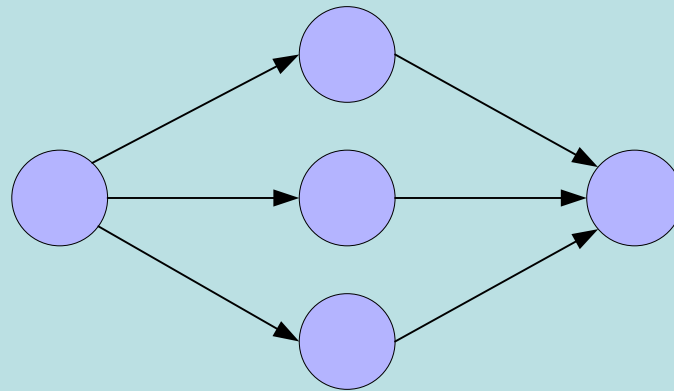
Sequence



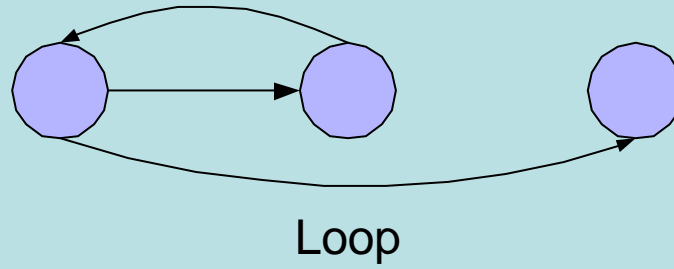
Selection – if statement



Selection – if-else statement

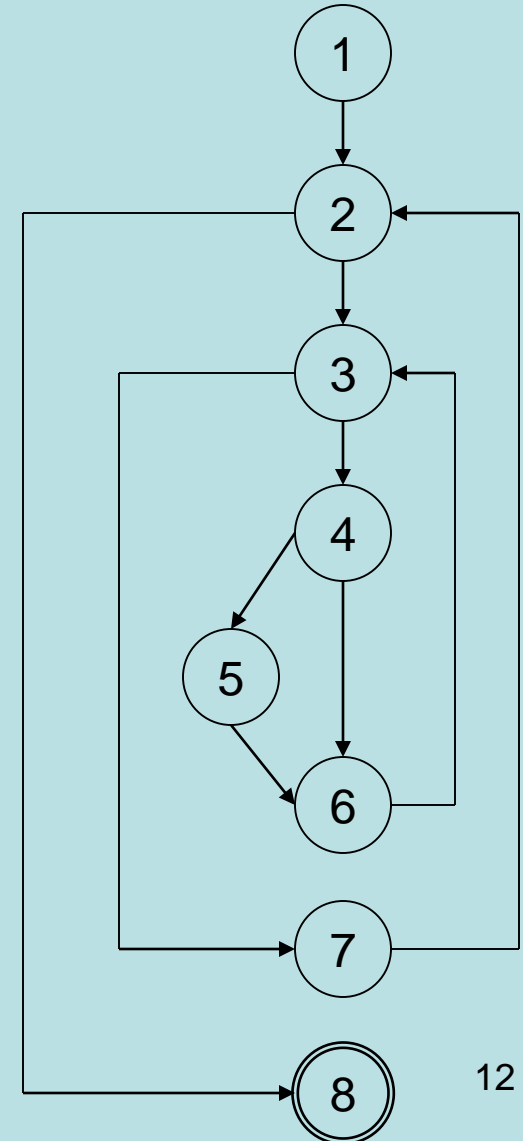


Selection – case statement



Flow graph for bubble sort

```
sorted = false;           // 1
while (!sorted) {         // 2
    sorted = true;
    for (int i = 0; i < SIZE-1; i++) { // 3
        if (a[i] > a[i+1]) { // 4
            swap(a[i], a[i+1]); // 5
            sorted = false;
        }
    }                       //6
}                           //7
                           //8
```



```
for (i = 0; i < N; i++) {  
    if (condition1)  
        // do something here  
    else  
        // do something here  
    // something here  
}
```

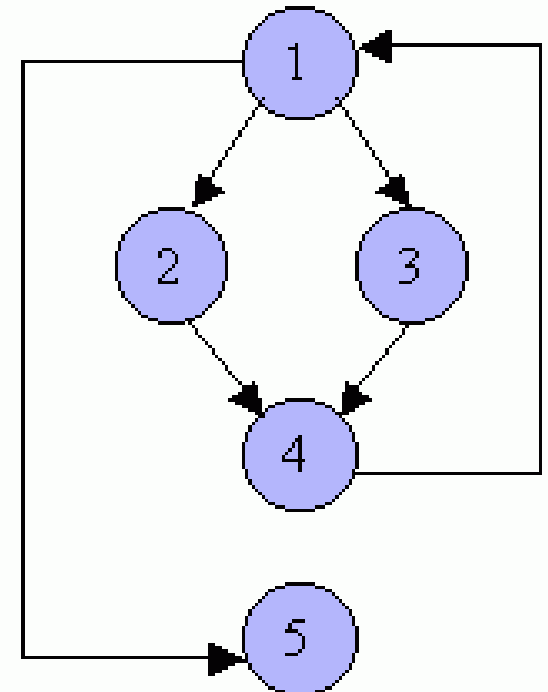
//1

//2

//3

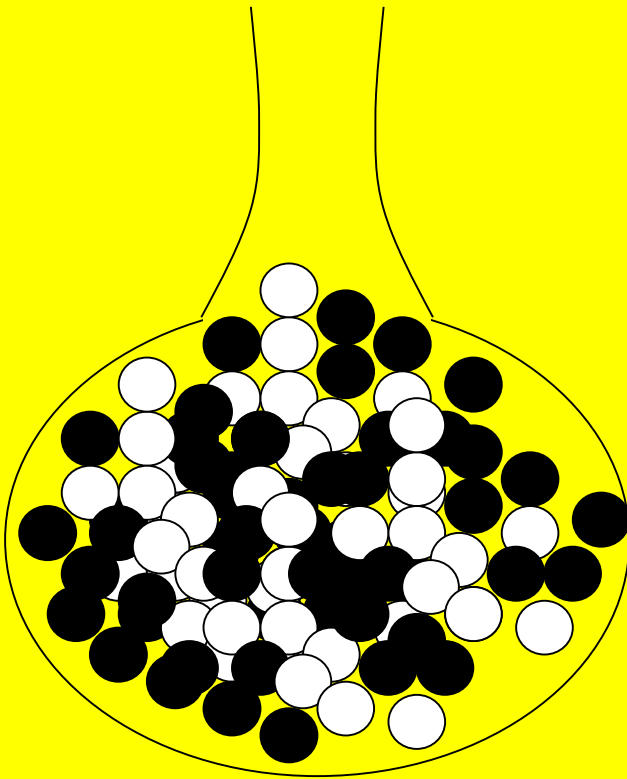
//4

//5

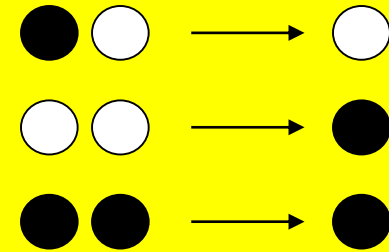


2^N Paths

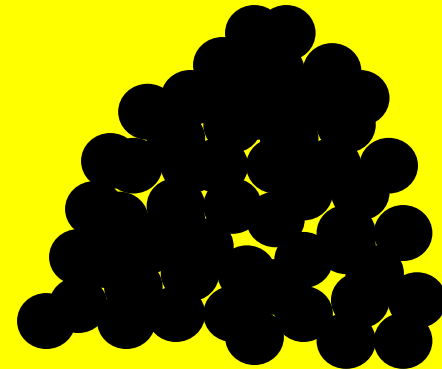
Dijkstra's Game



Jar of Black and White Balls



Rules of the Game



Heap of Black Balls