

Chapter 34 : Symmetric Linear Search.

In which we start to apply the Searching by Elimination technique.

In a previous article we considered the generic searching by elimination algorithm. It is as follows where W is a finite non-empty set and F is a boolean function defined on the elements of W .

```
{⟨ $\exists w : w \in W : F.w$ ⟩}

V := W
;do #.V  $\neq$  1  $\rightarrow$  {P0  $\wedge$  P1  $\wedge$  #.V  $\neq$  1}

    “choose a, b  $\in$  V, where a  $\neq$  b”
    if F.a  $\Rightarrow$  F.b  $\rightarrow$  V := V  $\setminus$  {a}
    [] F.b  $\Rightarrow$  F.a  $\rightarrow$  V := V  $\setminus$  {b}
    fi

    {P0  $\wedge$  P1}

od
x := “the unique element in V”

{F.x}
```

In many cases the set we are dealing with is ordered and we can refer to it as

$$W = [M..N] \quad , M \leq N$$

This gives us the following refinements of the algorithm

```
a, b := M, N
;do a  $\neq$  b  $\rightarrow$  {M  $\leq$  a < b  $\leq$  N}

    if F.a  $\Rightarrow$  F.b  $\rightarrow$  a := a + 1
    [] F.b  $\Rightarrow$  F.a  $\rightarrow$  b := b - 1
    fi

od
; x := a
```

This known as the symmetric linear search.