

4/7 Algorithms Chap. 3.

$\max(a_1 \dots a_n \in \mathbb{N})$ $\xrightarrow{\text{math}}$ $\text{integer} \rightarrow \text{P.L.}$
 $S \equiv \text{formal par.}$

(! Type is a set!)

$\max(3, 5, 1, 8, 9)$
 $0 \ 1 \ 2 \ 3 \ 4 \rightarrow \text{actual par. (arg.)}$

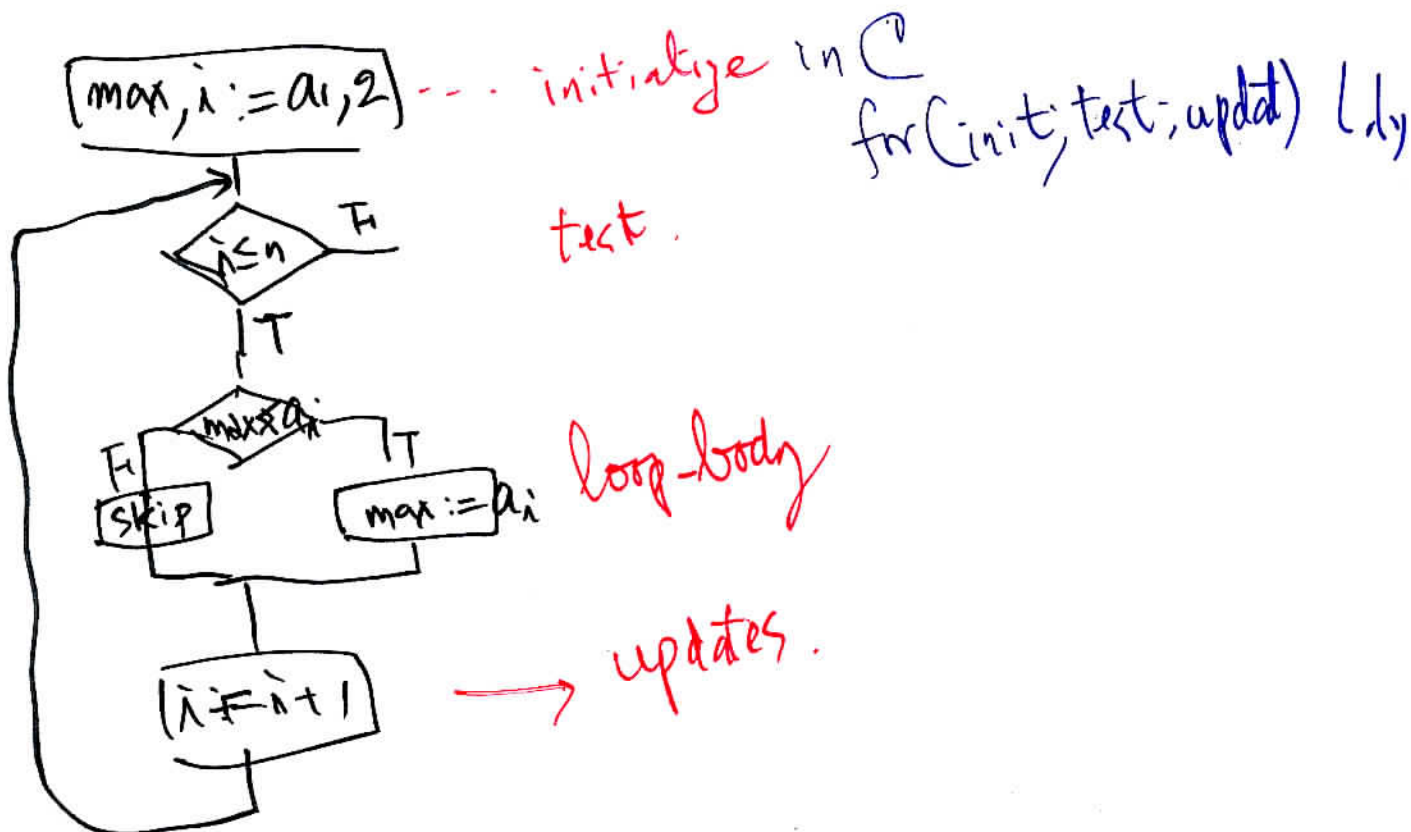
max = 4

max = max($a_1 \dots a_n$)

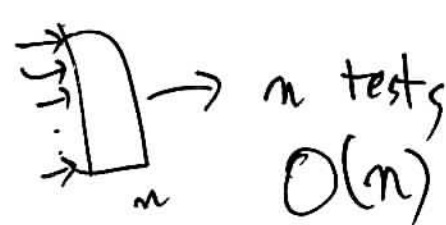
$\equiv \max \geq a_1, \max \geq a_2, \dots, \max \geq a_n$

$\equiv \forall i: 1 \leq i \leq n: \max \geq a_i$

$\equiv 1 \leq i \leq n: \max \geq a_i$



Linear Search
Binary Search



$x > a_m \Rightarrow x > a_1, x > a_2, \dots, x > a_m$
 $\rightarrow i := m$

$x = a_m$ we get loc := m

$x < a_m \Rightarrow x < a_m, x < a_{m+1}, \dots, x < a_n$

$j := m$

$\log_2 n$
 $O(\log_2 n)$

a.b.c.d := A, ..., D

do
a > b \rightarrow a, b := b, a
b > c \rightarrow :
c > d \rightarrow :
od

a, b, c, d := 1, 2, 3, 4
S := 0, i := 1
do i ≤ 100 \rightarrow ~~S := S + i~~
i := i + 1

Two conditions

1. loop invariance

2. loop terminating monotonically decreasing

od

$P \wedge \text{BBB} : \text{final cmd. that you want!}$

positive in the loop

guarantee the termination of loop